SOUTHERN POWER AND INDUSTRY

JANUARY, 1955

COAL is BASIC

Authorities have estimated that by the year 2000, one half of all electricity will be produced by atomic energy. This should not alarm the coal producers, because by the year 2000 electric loads will have grown so much that 6 times as much coal will be required for power as at present. (See Timely Comments —page 37)

South & Southwest in 1975 . . 39

Our needs and opportunities

Bark & Coal Burned Together . 43

North Carolina paper mill

Instrumentation in Industry . . . 48

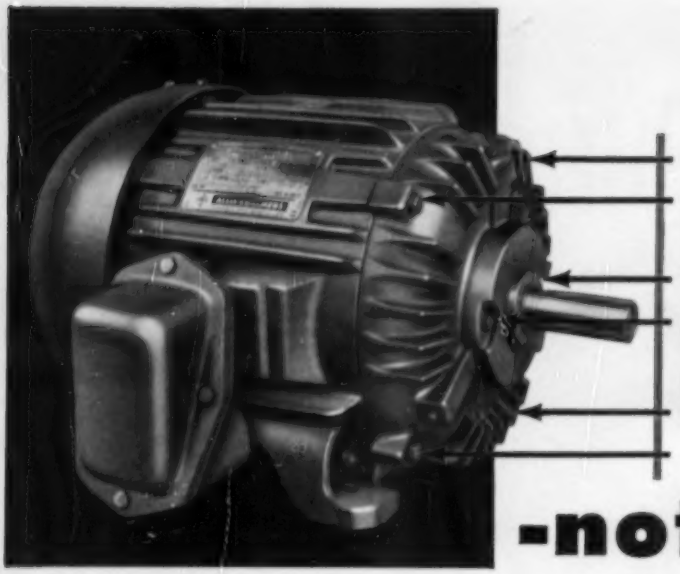
Carolina conference highlights

Effective Plant Management . . 58

Texas industrial report

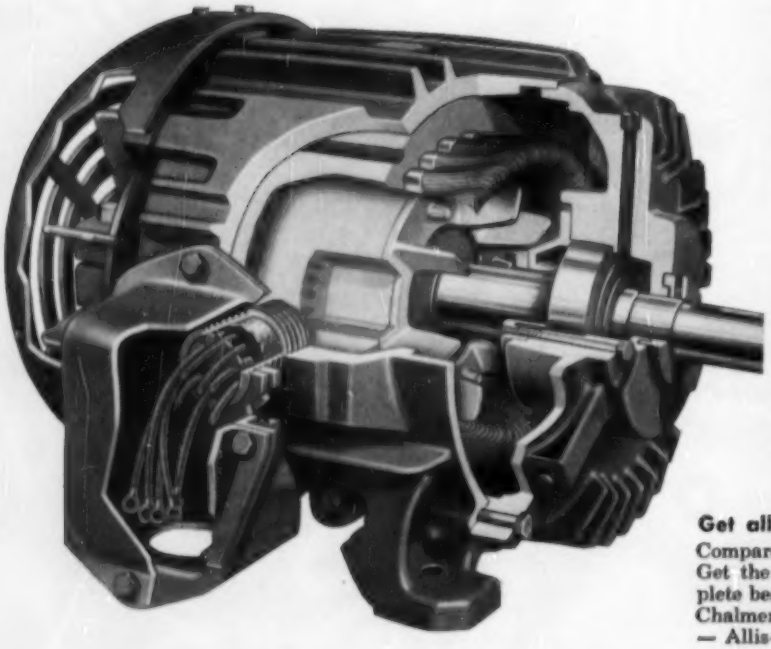
See Complete Table of Contents.....Page 3

Ad Index, page 96



It takes Six Bolts -not just four

to give full bearing protection for greater motor performance



THE TWO EXTRA BOLTS in the end housing of every Allis-Chalmers ball bearing motor are the proof of *extra* protection against bearing failure. These are the bolts that hold the bearing cap tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure . . . protects the grease and the bearing against contamination from dirt and moisture.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

Result? Allis-Chalmers motors pay off in longer, trouble-free bearing life, lower motor maintenance.

Get all the facts . . . judge for yourself — Compare Allis-Chalmers motors with other motors. Get the six-bolt construction that gives you complete bearing protection. For proof, see your Allis-Chalmers Office or Authorized Distributor, or write — Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-4540

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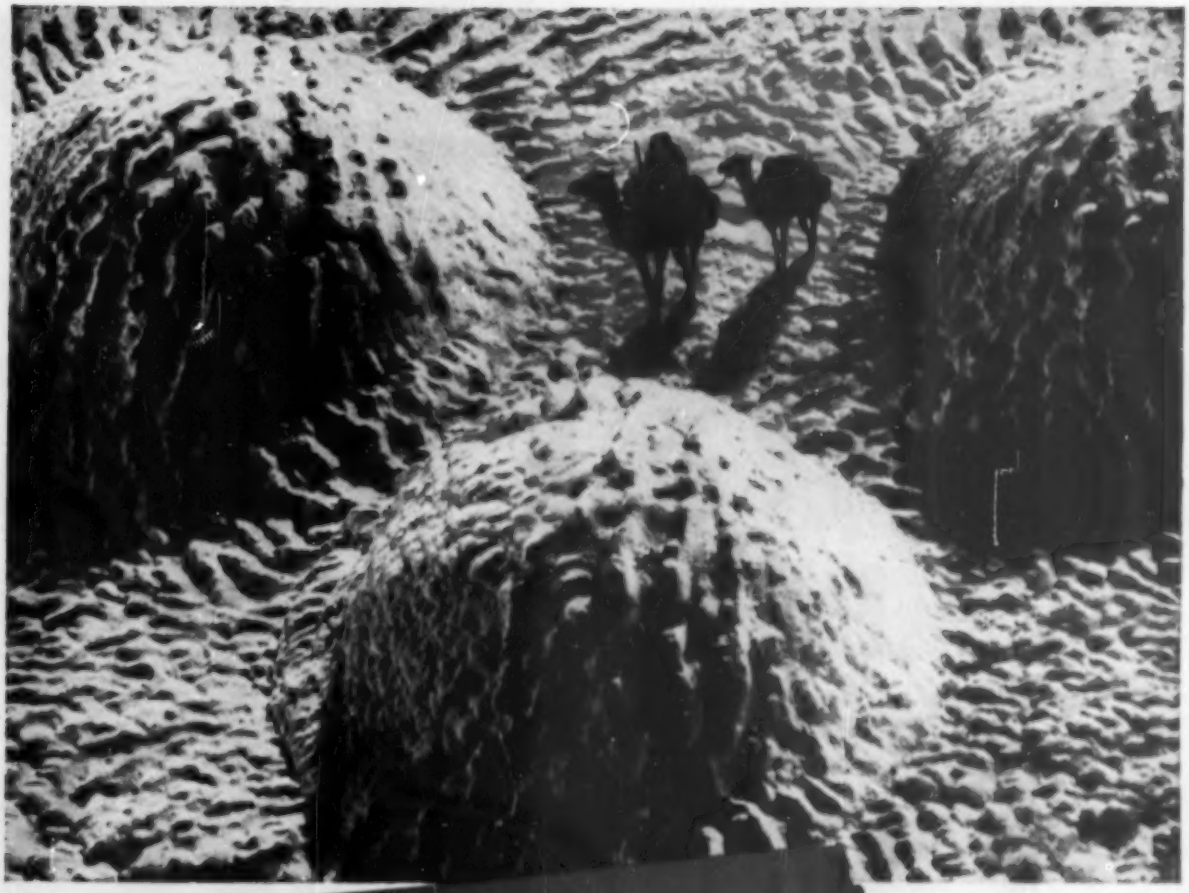
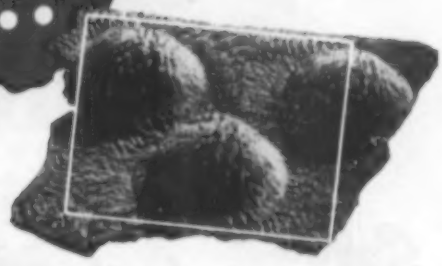
Volume 73 Number 1



Desert Waste...



Rectangle in small photo shows area of scale sample in large illustration. "Hills" are scale-covered rivet heads. Approximate size of sample: 7" x 5". *Nalco Laboratory photo.*

THIS "desert" was formed under water—improperly treated boiler water. It represents needless waste in several ways... Boiler down time... Overheated drum and rivet metal... Loss of heat transfer efficiency... Sluggish response to load changes.

Since the scale was removed, The Nalco System has kept the boiler clean-to-metal and corrosion-free continuously—and economically. Where conditions require uninterrupted boiler operation, The Nalco System can also be utilized to remove old scale, as well as prevent new deposits. Either way, The Nalco System is your assurance of *permanent water treatment results.* Write for prompt action on your problems.

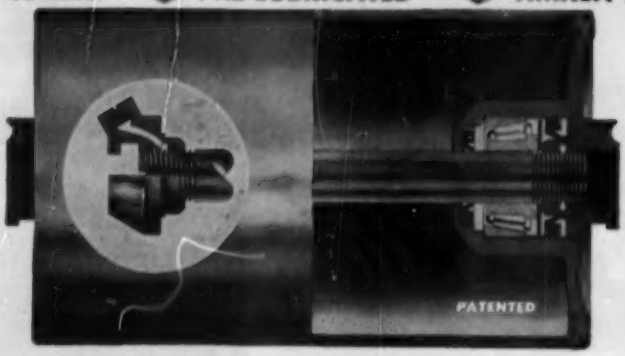
NATIONAL ALUMINATE CORPORATION
6226 West 66th Place
Chicago 38, Illinois

Canadian inquiries should be addressed to Alchem Limited, Burlington, Ontario

THE Nalco® SYSTEM • **Serving Industry through Practical Applied Science**

You Need... CONTINENTAL'S UST Idlers

CGC UNIT-SEALED CGC PRE-LUBRICATED CGC TIMKEN BEARINGS



Saves Grease!
Saves Labor!
Saves Belts!
Long Life - THE ULTIMATE IN MINIMUM MAINTENANCE

Continental's Unit-Sealed "UST" Conveyor Idlers, incorporating Timken Bearings, Garlock Klozures, are the answer to the operator's prayer.

The Unit Bearing Assemblies—"sealed unto themselves" provide an ample but not excessive grease reservoir. This represents a saving of grease and further eliminates any possible migration of the grease from upper to lower bearings on inclined rolls. The lubricant is a top quality water repellant grease of a stable consistency with a wide temperature range for long life.

Most important—this construction permits operating the Continental "UST" Idler for extended periods of time without relubrication for 1-2-3 years or longer depending upon the severity or character of conditions.

For detailed information on these idlers write for Bulletin S.I.-116

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CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA
ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • KNOXVILLE CGC MANUFACTURERS
NEW YORK CITY

SOUTHERN POWER AND INDUSTRY

JANUARY 1955

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Feature Articles in This Issue

Development Trends in the South

Outlook for the South and Southwest Through 1975 39

Design, Operation and Maintenance

Bark and Coal Burned Simultaneously in N. C. Plant 43

Process Control and Instrumentation Conference 48
Instrumentation as a Management Tool
Selection of Variables for Process Control

Electronic Metal Detectors in the Processing Industry 54

The Dimensions of an Effective Plant Manager—Part I 58

Five Steam Turbines Drive Centrifugal Compressors 64

Method of Handling and Dumping Loaded Boxes 68

Reference Guide on Atomic Energy Information 70

Helping the Man-in-the-Plant

Controlling Dust & Fumes 72
Aid for Valve Repairs 72
Packless Valves Pay Off 73
Spray-Lube System 73
Vapor Purging Method 74
Solving Lint Problem 74
Cut Gaskets Right 74
Tube Bundle Disassembly 75
Small Boiler Efficiency 76
Cylinder Liner Change 76
Use for Discarded Hose 77
Dual Fuel Firing 77
Portable Drill Press 78
Mobile Trash Collector 78
Shop Designed Tumbler 79
Driving Taps & Reamers 79

Regular Features — Departments

Facts and Trends 4
News of the South 10
Future Events 12
Buyers Information 16
Timely Comments 37
Industry Speaks 39
New Equipment 80
Index to Advertisers 96

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Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

January, 1955

► ATOMIC BOMBARDMENT of polyethylene nearly doubles the heat resistance, improves solvent resistance and minimizes stress cracking of the popular thermoplastic. Current producers of irradiated polyethylene products predict extensive industrial applications.

Irradiated polyethylene vessels, offering economy over stainless steel, show promise in the food processing and chemical industries. Irradiated plastic tape for the electrical industry offers a combination of many desired qualities. Other products are now being plant-tested.

► THREE HURRICANES . . WHAT DID WE LEARN?--The largest industrial losses, according to Factory Mutual Engineering Division of Boston, Mass., occurred where the wind lifted UNANCHORED ROOFS. Unroofing a building usually causes business disruptions of far reaching consequences. Damage and disruption of this kind can be prevented at relatively small expense by providing the proper roof anchorage.

To help industries plan wind protection, the company has three informative bulletins. No. 7.10 (15 cents) explains how wind acts on a building, and the forces involved. No. 7.13 (25 cents) and No. 7.14 (10 cents) serve to guide the engineer and architect in designing roof anchorage. For copies write Publications Department, Factory Mutual Engineering Division, 184 High Street, Boston 10, Mass.

► ATOMIC ENERGY! What's happening? Where can one find out about it? Finding what you want to know can be an exasperating and time consuming task without an effective guide through the tons of papers and books written on the subject.

Check the "title-source-price" tabulation in this issue of SP&I, covering general development, radioactive isotope, atomic power, and business opportunity classifications. It's a practical guide prepared for the general industrial and power user.

► PRACTICE PROGRESSIVE OBSOLESCENCE--There is a story that Andy Higgins, the boat builder in New Orleans, built speedy river craft for both revenue agents and moonshiners in the days of Prohibition . . . . When he turned out a new model he sold it to the revenuers, and then developed a better and faster model and sold it to the moonshiners.

"What I practiced," he is reported to have said, "was progressive obsolescence." Hobart C. Ramsey, president of the Worthington Corporation, related the story recently to emphasize the importance Worthington places on new machines, methods and engineering ideas. Mr. Ramsey said, "In capital goods the dynamics of research today are such that unless a company practices progressive obsolescence it may find itself overtaken not by revenuers but by its fast-moving competitors."

► BIGGER & BETTER CONVEYOR BELTS--New, resilient synthetic fibers, while less bulky, result in stronger woven fabrics that make belts more resistant to impact shock. Belts using high tensile strength steel

(Continued on page 6)

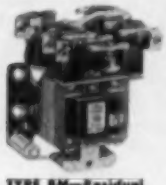
A-C & D-C TROUBLE FREE RELAYS

from 1 to 12 POLES

THE UTMOST IN RELAY DEPENDABILITY

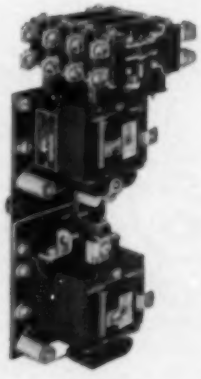
HUM-FREE A-C RELAYS

Relays in hospitals, churches, etc., must be hum-free. For these places, Types BM and BXL relays are recommended. Continuous coil currents are not needed to hold them closed. Also useful for machine tools.



TYPE BM—Residual Magnetic Latch

Contacts are held closed by residual magnetism of core. A demagnetizing coil current opens relay.



TYPE BXL—Mechanical Latch 2-Unit Relay

Lower solenoid trips the mechanical latch of the upper relay to open the upper relay contacts.

Bulletin 700 Relays are built to the same critical operating standards as the larger switching units in the Allen-Bradley line.

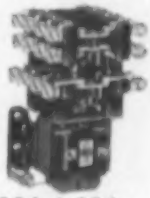
They have only one moving part . . . the simple solenoid plunger that opens and closes the double break, silver alloy contacts. Available in many varieties of contact arrangements . . . up to 12 poles . . . with or without enclosures. Long, trouble free life makes these relays the ideal pilot controls for installations which are likely to get infrequent inspection and maintenance.

Send for Bulletin 700 containing complete details on ratings, dimensions, and related accessories.

Allen-Bradley Co.
1328 S. Second St., Milwaukee 4, Wis.

TYPICAL RELAYS in the ALLEN-BRADLEY LINE

Relay in Enclosure



8 Pole A-C Relay

3-Wire Thermostat Relay

Low Current A-C Relay

D-C Relay

Bulletin 709 Size 3 Solenoid Starter

ALLEN-BRADLEY SOLENOID MOTOR CONTROL

CONSULT YOUR LOCAL ALLEN-BRADLEY REPRESENTATIVE

ALBUQUERQUE—A & A Supply Co., P. O. Box 1516, 114 Morningside Dr., N. E., Tel: 5-5506
ATLANTA—W. R. Calvarley, 1000 Peachtree St., N. E., P. O. Box 7086, Sta. C., Tel: Elgin 8833
BALTIMORE—H. M. Wood & Co., 124 Light St., Tel: MUlberry 5-4643-4
BIRMINGHAM—James L. Haworth Co., Inc., 3021 Seventh Ave., So., Tel: 53-1171
CHARLESTON—W. J. Hess, Room 302 Morrison Bldg., 815 Quarrier St., Tel: 2-5323
CHARLOTTE—Le Roy P. Spoon, 307 Lincoln St., Tel: EDison 4-6334
DALLAS—J. K. Webb, 2810 McKinney Ave., Tel: Tenison 6179
HOUSTON—Wilson Electrical Equip. Co., 2930 Commerce Ave., Tel: Atwood 1537
JACKSONVILLE—Robert P. Smith Co., 2051 Hendricks Ave., Tel: 9-9474
KANSAS CITY—B. L. McCreary & Son, 1819 Central St., Tel: Harrison 1668
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NEW ORLEANS—Robbins & Robbins, 1037 Magazine St., Tel: Canal 5805
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SAN DIEGO—James A. Satchell Co., Inc., 301 W. "G" St., Tel: BElmont 3-3981
TULSA—John W. Elder Co., 1526 East Fourth St., Tel: 3-9149

cables can be designed to operate at tensions as great as 3,000 lb per in. of belt width; and new additives to rubber cover compounds improve cover resistance to sunlight aging and ozone deterioration.

Continuous belting, up to 1,000 ft in length without transverse seams, is now being produced regularly. Other advances, recently noted by B. F. Goodrich include: fire-resistant polyvinyl and neoprene compounds for belts that do not support combustion; new fiberglass and asbestos fabrics, together with new heat-resistant rubber compounds, for improved service life of hot material belts; and special rubber belt covers that resist acids, alkalies, salts, chemical vapors and other deteriorating materials.

► ABUNDANT WATER may well prove to be the most important natural resource of the South and Southwest. Water--a basic raw material and processing agent for virtually all plant operations--is a prime site-selection factor in most large industries.

Florida's natural water resources are exceeded by those of no other area of equal size on the American continent; and the entire coastal plains area of the South possesses a large undeveloped quantity of surface water that is generally of good chemical quality.

► FIRST ALUMINUM OIL DERRICK is in service in Oklahoma's Golden Trend oil field. The telescoping derrick, for use on a portable oil field servicing unit, has square tubular aluminum legs and bracings to give maximum strength. Weight is reduced 40%.

Reynolds Metals Company and Franks Manufacturing Corporation of Tulsa worked together in building the lightweight aluminum derrick. In the past, difficulty has been encountered in keeping such equipment within highway weight limits.

► NEW COIL INSULATION SYSTEM for large motors eliminates the use of cotton and paper based materials which have no inherent insulating qualities. G.E. is using POLYEX, a combination of Dacron tape, Mylar polyester films and a synthetic hydrocarbon resin--materials which are insulators within themselves.

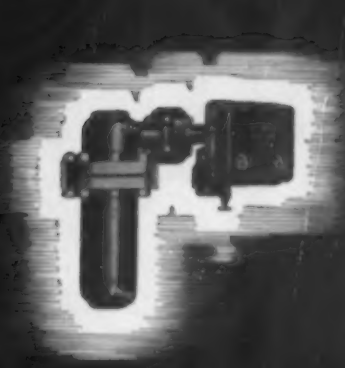
Heat aging tests of the new Class A insulation show large increases in mechanical and dielectric strength. Resistance to contaminants, shown by salt water immersion tests, is reported at least twice that of conventional insulation. Polyex is now available on induction motors of 100 to 3,000 hp rating and plans are being made to extend the horsepower range.

► NORTH CAROLINA is now the leading FURNITURE MANUFACTURING STATE in the nation. In 1953, according to recent Department of Commerce figures, North Carolina shipped furniture and bedding valued at $263,154,000. The nearest other state to that mark was New York with shipments valued at $238,597,000.

► "LARGEST STEAM TURBINE-GENERATOR IN THE WORLD" to be installed in the River Rouge Plant of the Detroit Edison Company is an Allis-Chalmers 300,000 kw cross-compound unit. A 2 million pound per hour Foster Wheeler steam generator will deliver 2450 lb, 1050 F steam at the superheater outlet. Steam will be reheated to 1000 F. Scheduled for completion in 1957, plant is designed to produce a kilowatt hour for less than ¾ lb of coal.

► PLAN AHEAD--You can start off the year on the right foot by planning for ODORLESS DECORATION WEEK. TAKE TEA AND SEE WEEK is on the docket for January 14th with LARGE SIZE WEEK (Chain Drug Stores) overlapping a few days. POTATO CHIP WEEK, starting January 24th rounds out your month.

Write the editors for additional information on any of the above items. SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 5, Ga.



THE DEPENDABLE PERFORMANCE OF **FISHER** LEVEL-TROLS
IS ESTABLISHED BY THE TENS OF THOUSANDS OF THESE UNITS
IN WORLD WIDE SERVICE

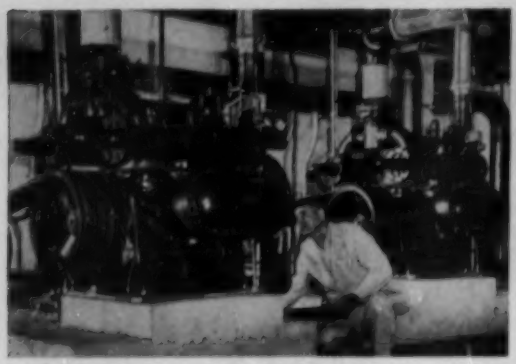
FISHER GOVERNOR COMPANY • Marshalltown, Iowa

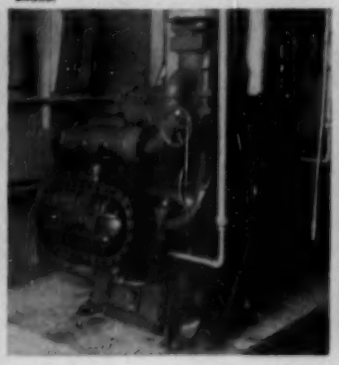
WORLD LEADER IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

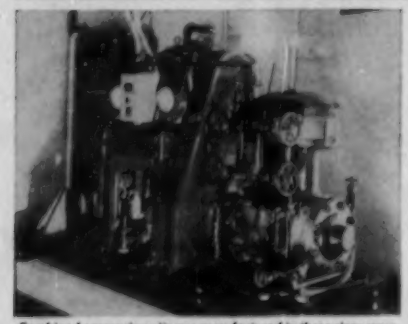
Frick "ECLIPSE" Type PF compressors, built in six sizes up to 150 H.P. and having 2, 3, 4, 6 or 9 cylinders, may be used with any refrigerant at any temperature. They are ideal for such work as air conditioning, marine service, watercooling, food storage and processing.

"ECLIPSE" Type AHP compressors are available for regular ammonia service under high operating pressures. These heavy-duty machines are built in three sizes with 3, 6, or 9 cylinders of 3½" bore and 4¼" stroke.

"ECLIPSE" Type PAS booster compressors, built in six sizes, are noted for their dependability and efficiency. Small frosted lines cool the cylinder valve plates with direct-expansion refrigerant—a patented Frick feature.

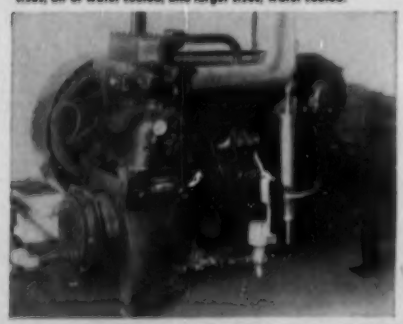






Combined ammonia units are manufactured in three sizes ranging from 2½ to 10 tons of refrigeration. They are a popular choice for food service, cooling drinking water, making ice, dairy plants, etc.

Frick low pressure units are built in 36 sizes from ¼ to 15 hp. Condensers on smallest machines are air cooled; on intermediate sizes, air or water cooled; and larger sizes, water cooled.



FRICK COMPRESSORS

the Refrigeration Industry's Most Comprehensive Line

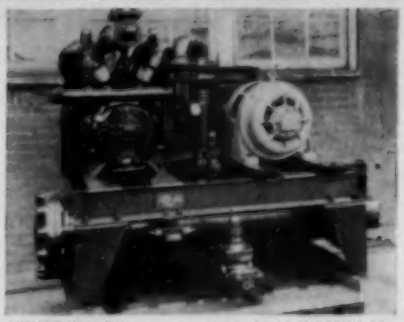
83 Types & Sizes

When you specify Frick machines you have the widest choice of models, and are sure of getting a compressor exactly suited to your needs.

Are you handling one of the Freons, or ammonia, or some other refrigerant? At what temperature? Whatever your load, there's a Frick machine built to meet every commercial and industrial requirement.

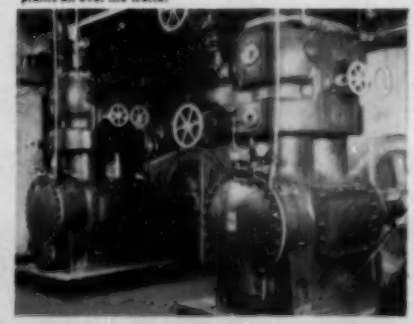
Tell us about your cooling work, and we'll send you the full facts and figures on Frick equipment to match the job. Branches and Distributors in principal cities, or write directly to

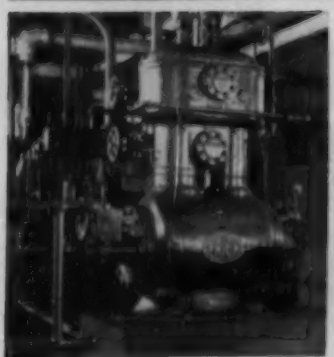
FRICK CO.
WAYNESBORO, PENNA. U.S.A.



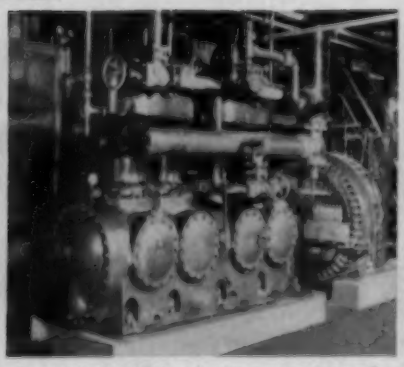
"ECLIPSE" Type PF low pressure units are furnished in 15, 20, 30, 40 and 60-hp. sizes. Shell-and-tube coolers may be added to form compact water chilling units.

Frick Company pioneered the development of the booster compressor. Since 1929 these Type FB machines, built in seven sizes, have been regularly installed by ice cream and quick freezing plants all over the world.

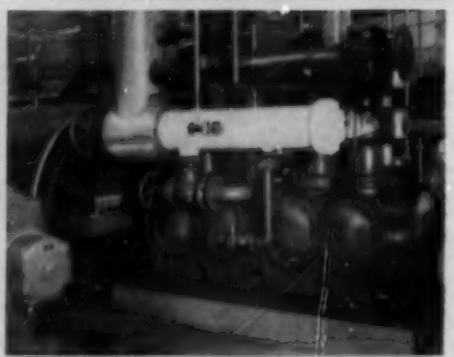




Frick two-cylinder enclosed Type V.S.A. ammonia compressors have been perfected over the past 40 years, until today they are the standard of the industry. They are available in capacities from 2 to 300 tons, in 11 sizes.

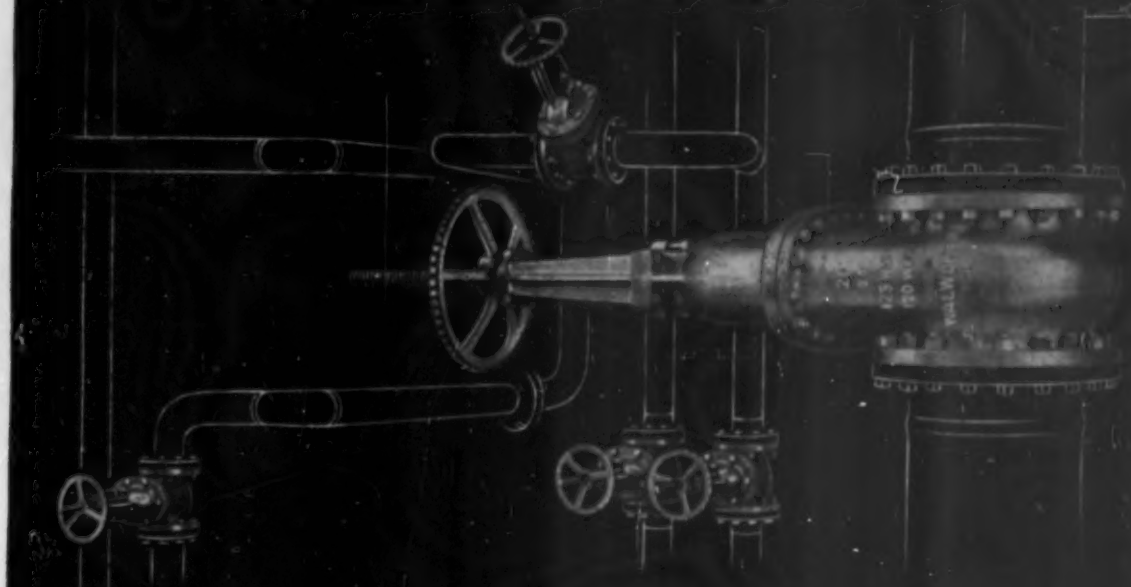


Four-cylinder Type V.S.A. enclosed compressors are normally offered in four sizes with capacities up to 800 tons. Furnished with capacity controls on each cylinder, these machines give the user maximum flexibility and durability on heavy-duty refrigerating service, such as in the food and chemical industries.

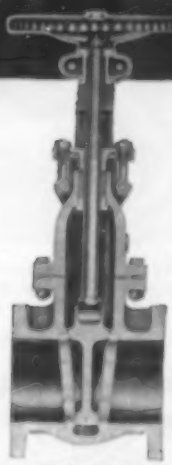


Frick four-cylinder Type FB enclosed V.S.A. ammonia booster and Freon-12 compressors are available in 15" by 10" and 17½" by 12" sizes. Seabrook Farms, the world's largest quick-freezing plant, has eight of the larger size.

WALWORTH



IRON BODY WEDGE GATE VALVES



Walworth No. 726F OS&Y (Outside Screw and Yoke) Iron Body Wedge Gate Valve. OS&Y valves are recommended for services where it is desirable that the line fluid does not come in contact with the stem threads. Note the swing-type gland-eye-bolts for easy repacking. Sizes 2 to 30 inches.

Better because ...**The entire valve, from handwheel to seat rings, is ruggedly constructed to withstand rough and frequent usage. Body, bonnet, and yoke are sturdy castings with large radius fillets. Dimensions and drilling of end flanges are in agreement with American Cast Iron Flange Standards. Stiffening ribs connect end flanges with the body neck to maintain a rigid connection with piping.**

A wide range of Walworth Iron Body Wedge Gate Valves is available—through your Walworth Distributor—from which you can choose the right type to meet your most exacting conditions. Saddle-type valves as small as ¼-inch; low pressure valves for water and gas pipelines up to 36 inches.

Whenever you need valves and fittings, choose from complete lines—in a variety of metals—manufactured by Walworth. For more information, see your Walworth Distributor or write: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

NEWS for the South and Southwest

Carbide & Carbon Promotions West Virginia and Texas

CARBIDE AND CARBON CHEMICALS COMPANY, a Division of Union Carbide and Carbon Corp., 30 East 42nd St., New York 17, N. Y., has announced several promotions.

ROLAND D. GLENN has been appointed general superintendent of the SOUTH CHARLESTON, W. VA., plant to succeed K. H. Rowland, who has been transferred to New York. Mr. Glenn has been with the company since 1934, and was formerly superintendent in charge of resins and chemicals.

Other promotions at the South Charleston plant include that of FREDERICK H. BELDEN to superintendent in charge of gaseous raw materials, gas production, utilities, and office. Prior to this appointment Mr. Belden was assistant superintendent at the Texas City plant.

ARTHUR P. MOSS, who was previously assistant superintendent in charge of chemicals production at the company's Institute, W. Va., plant, has been appointed superintendent in charge of resins and chemicals at South Charleston.

Changes at the INSTITUTE, W. VA., plant include appointment of HENRY B. COONS and L. N. DICKINSON as assistant superintendents in charge of chemicals production. Mr. Coons was formerly area supervisor at the South Charleston plant; and Mr. Dickinson was area supervisor at the Institute plant.

R. C. HIERONYMUS, who has been in charge of all raw materials and olefin production at the TEXAS CITY, TEXAS, plant, is now assistant superintendent in charge of all gas production and related units at that plant.

THIS NEW Carolina construction products plant supplements other numerous Armco Drainage & Metal Products' fabricating operations in the South and Southwest.

Armco Drainage & Metal Products' Raleigh Fabricating Plant Now in Full Production

Most recent addition to ARMCO DRAINAGE & METAL PRODUCTS' Southern operations is the RALEIGH, NORTH CAROLINA, plant now fabricating sanitary sewer, storm sewer, dredge and culvert pipe; pontoon tanks; oil and gas storage tanks; and pipe arch. Plant also serves as a warehouse for the extensive line of Armco construction products available to contractors, industrial, power and large service plants.

Carolina sales manager is I. G. TUTTLE with headquarters at 501 Commercial Bldg., RALEIGH, NORTH CAROLINA. Sales engineers for the Carolinas' office are also located in GREENSBORO, N. C.; CHARLOTTE, N. C.; COLUMBIA, S. C., and GREENVILLE, S. C.

FRED ARMSTRONG is superintendent of the Raleigh plant and J. W. BRUTON, assistant superintendent.

Armco's Carolina operation is part of the Dixie Division managed by WARREN S. MANN, vice president of Armco Drainage & Metal Products, Inc., with headquarters in ATLANTA, GEORGIA. The recent expansion gives Armco fabricating operations in NORTH CAROLINA, GEORGIA, FLORIDA, TENNESSEE, TEXAS, LOUISIANA, and OKLAHOMA. Southwestern Division, with headquarters in the C & I Life Building, HOUSTON, TEXAS, is under the direction of T. M. NEIBLING.

Shanks is Res. Engr. for Bailey Meter Co.—W. Va.

C. D. SHANKS of BAILEY METER COMPANY, Cleveland, Ohio—manufacturers of industrial instruments and automatic control equipment—has been appointed a resident engineer with headquarters at 6C Chilton Manor, Bridge Road, CHARLESTON, W. VA.

The Charleston territory includes southern West Virginia and western Virginia.

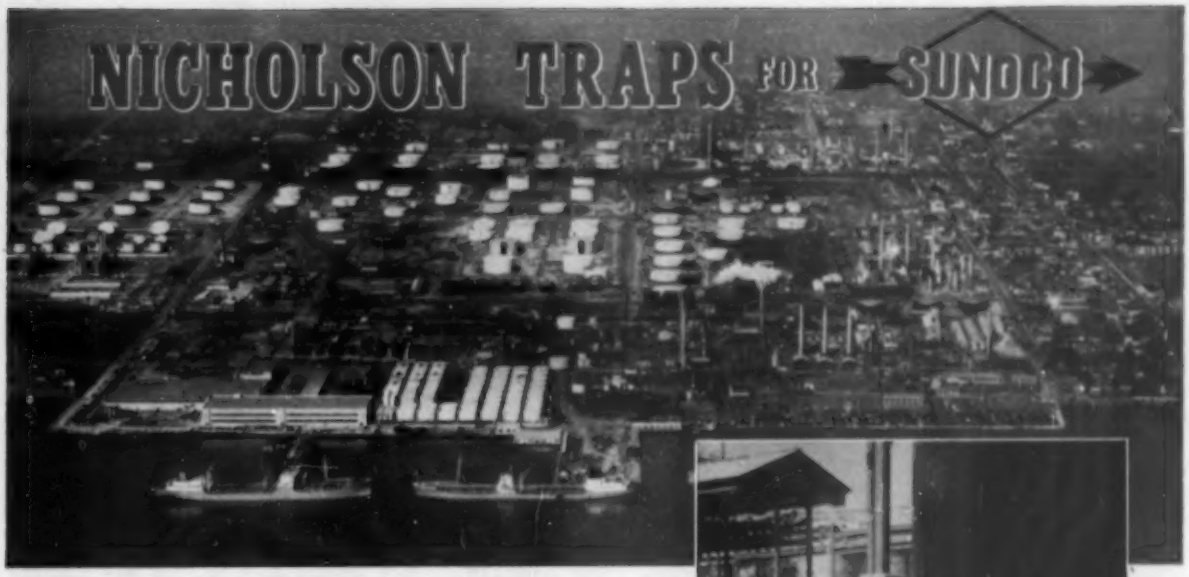
Van der Horst Expands Terrell, Texas Plant

The VAN DER HORST CORPORATION, Olean, New York, has announced a $400,000 expansion program for its TERRELL, TEXAS, plant.

The Terrell plant, established in 1952, has been limited in production by an existing 18,500 amp plating capacity, and a more than 100% increase to 40,000 amp is one of the major factors in the expansion. Facilities for iron plating are also being added. According to K. L. VAN DER HORST, general manager of the Texas operation, potential productive capacity will be tripled.

Van der Horst's patented iron and chromium plating processes are used extensively for the reclamation of worn cylinders of internal combustion engines in railroad, power, oil, and gas industries. The company also produces "Porus-Krome" processed liners, used as standard equipment by several engine manufacturers.

NICHOLSON TRAPS FOR SUNOCO



Air view of Sun Oil Company's refinery at Marcus Hook, Penna.

Standard for

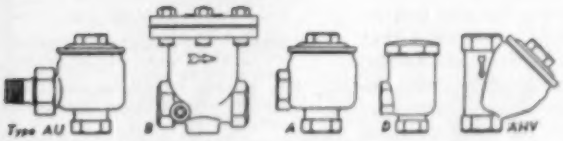
OUTDOOR USE

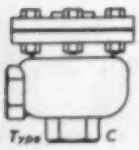
Due to

FREEZE-PROOF

Feature

Nicholson steam traps are shown above installed on storage tanks requiring heating at Sun Oil Company's Marcus Hook, Pa., refinery. Sun has standardized on this type of installation.





SIX TYPES FOR PROCESS, HEAT AND POWER -- Construction of bronze, semisteel or cast steel. In sizes of ¼" to 2" for pressures to 300 lbs. All six types of traps have stainless steel valves and seats. Bellows are furnished in bronze, monel or stainless steel.

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W. H. NICHOLSON & CO.

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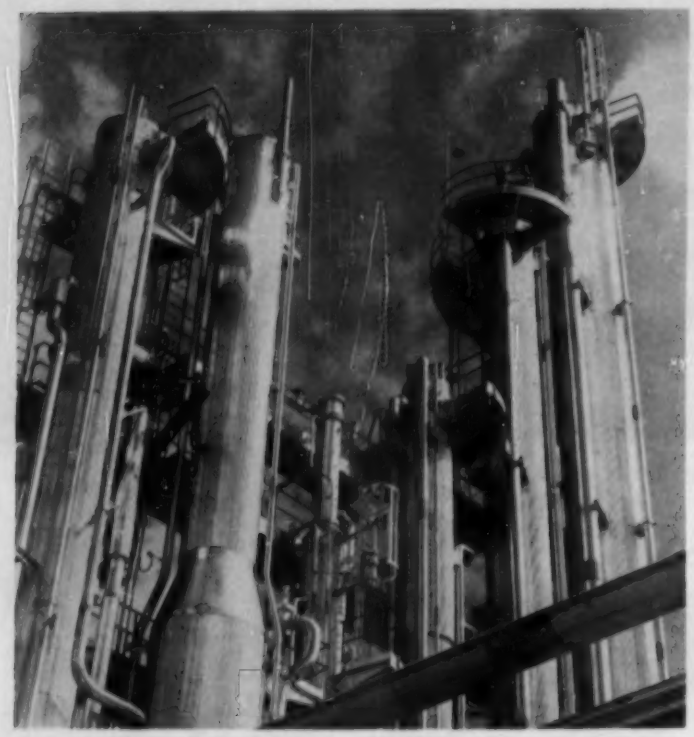


Raw material for Tenite Polyethylene is ethylene made by cracking propane. These separation columns tower over the cracking furnaces at the Longview, Texas, plant.

Texas Eastman Producing Polyethylene Molding and Extrusion Plastic Pellets

Tenite Polyethylene, marketed by Eastman Chemical Products, Inc., is being manufactured by TEXAS EASTMAN COMPANY, LONGVIEW, TEXAS. It is the latest product to come from this relatively new Eastman Kodak division, which went into operation early in 1952.

Starting with propane, ethylene is produced, and this is later converted to Tenite Polyethylene. The new polyethylene plant has a capacity of twenty million pounds annually.

A visible feature of Tenite Polyethylene is its entirely new form—spherical pellets, for both molding and extrusion. This form has numerous advantages for the user. The spherical pellets will flow more uniformly from the hopper into the heating cylinder of the molding or extrusion machine. This reduces the chance of bridging-over, which often happens with cubical pellets or granulations. Polyethylene pellets of the new type are easier to keep clean in storage and use. Their smooth spherical surface will not readily catch or hold dust and foreign particles. Also, it is estimated that they have a 10% lower bulk factor, thus requiring less storage area. Because of the fewer fines with the spherical pellets, it is easier to clean the hopper of the molding or extrusion machine when changing color.

It is expected that Tenite Polyethylene will be used for pipe, squeeze bottles, housewares, wire and cable coating, film for packaging and laminating, and the many other products for which this plastic is so ideally suited.

Carload shipments of Tenite Polyethylene will be made from Longview, Texas, and less carload shipments as well as shipments of colors from Kingsport, Tennessee.

More News—Page 85

Stevens Assoc. to Represent W. A. Jones in Florida

W. A. JONES FOUNDRY & MACHINE CO., 4401 Roosevelt Road, Chicago, Ill., announces the appointment of STEVENS ASSOCIATES & COMPANY of LAKELAND, FLORIDA, as its representative in Florida.

Stevens Associates & Co., headed by M. C. DE STEFANO and WARREN MINICH, specializes in industrial mechanical power transmission, materials handling conveyors and elevators and engineered equipment for mining processes relating to flotation, dynamic classification and separation.

FUTURE EVENTS Of Engineering Interest

PLANT MAINTENANCE & ENGINEERING SHOW, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.
Jan. 24-27, Industrial Exposition, International Amphitheatre, Chicago, Ill.

HEATING AND VENTILATING EXPOSITION, E. K. Stevens, Mgr., International Exposition Co., 480 Lexington Ave., New York 17, N. Y.
Jan. 24-28 12th International Heating & Ventilating Exposition, Commercial Museum and Convention Hall, Philadelphia, Pa.

INSTRUMENTATION FOR THE PROCESS INDUSTRIES, K. L. Puffer, Pub. Chm., P. O. Box 6226, Houston 6, Texas.
Jan 26-28, 10th Annual Symposium, School of Engineering, Chemical Engineering Dept., Texas A&M College, College Station Texas.

NATIONAL ASSOCIATION OF PURCHASING AGENTS, Fred D. Bradley, Chm. Public Utility Buyers' Group, Southern Union Gas Co. Burt Bldg., Dallas 1, Texas.
Feb. 13-15, 24th Annual Mid-Winter Conference, Shamrock Hotel, Houston, Texas.

NATURAL GASOLINE ASSOCIATION OF AMERICA, Wm. F. Lowe, Sec'y-Treas., 422 Kennedy Bldg., Tulsa 3, Okla.
Feb. 25, Permian Basin Regional Meeting, Scharbauer Hotel, Midland, Texas.
Apr. 13-15, 34th Annual Convention, Baker and Adolphus Hotels, Dallas Texas.

SOUTHERN SAFETY CONFERENCE, INC., W. L. Groth, Exec. Dir., P. O. Box 2227, Richmond 25, Va.
Feb. 27-Mar. 1, 16th Annual Conference and Exposition, Jung Hotel, New Orleans, La.

AMERICAN SOCIETY OF LUBRICATION ENGINEERS, W. P. Leonard, Sec'y, 343 S. Dearborn St., Chicago 4 Ill.
Apr. 13-15, Annual Meeting and Exhibit, Chicago, Ill.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, C. E. Davies, Sec'y, 29 West 39th St., New York, N. Y.
Apr. 18-21, Diamond Jubilee Spring Meeting, Lord Baltimore and Southern Hotels, Baltimore, Md.

NATIONAL MATERIALS HANDLING EXPOSITION, Clapp & Poliak, Inc. 341 Madison Ave., New York 17, N. Y.
May 16-20, Exposition, International Amphitheatre, Chicago, Ill.

INDUSTRIAL MARKETING ASSOCIATES, INC., John Paul Taylor, Exec. Sec'y, 520 Pleasant St., St. Joseph, Mich.
May 29-30, Annual Meeting, The Cloister, Sea Island, Georgia.

BASIC MATERIALS CONFERENCE AND EXPOSITION, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.
May 31-June 3, Conference and Exposition, Philadelphia, Pa.

POWELL VALVES . . . THE COMPLETE QUALITY LINE . . . POWELL VALVES

POWELL VALVES FOR POWER PLANTS

FIG. 375—Bronze Gate Valve For 200 Pounds W.S.P

FIG. 1793—Iron Body Bronze Mounted Gate Valve For 125 Pounds W.P.

FIG. 19003—900-Pound Pressure Seal Gate Valve

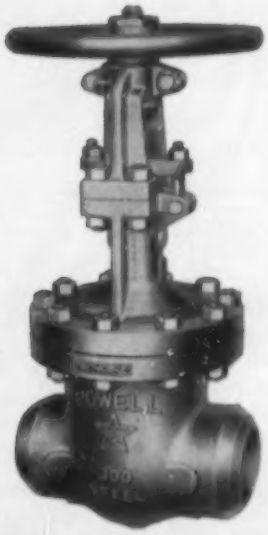


FIG. 3003—Steel Gate Valve For 300 Pounds W.S.P.

POWELL VALVES . . . THE COMPLETE QUALITY LINE . . . POWELL VALVES

Just name the valve you need for your power plant—Powell can supply it. And you can be certain that every Powell Valve will give you *dependable* flow control.

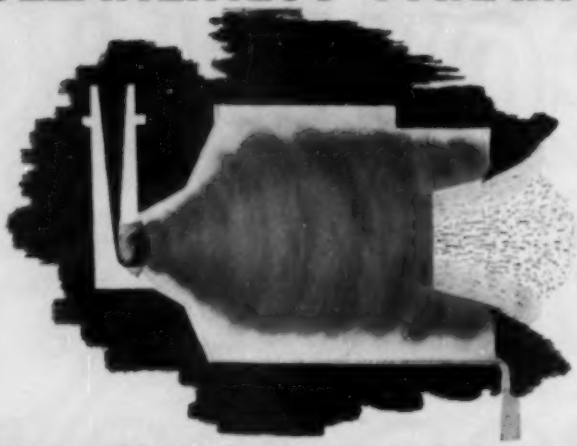
Shown above are just a few Powell Valves for power plants. Investigate the *complete* line of quality valves that have a proven record of long life and dependable service.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our complete line, and help solve any flow control problem you may have. Write . . .

The Wm. Powell Company, Cincinnati 22, Ohio..... 109TH year

WITH STACK CLEANLINESS PARAMOUNT...

EASTMAN KODAK SELECTED A



B&W CYCLONE FURNACE BOILER

Faced with all of the problems common to power generation — fuel quality, fly-ash handling, unit availability, initial cost, maintenance cost — Eastman Kodak also has had to give major attention to the all-important factor of cleanliness at its Kodak Park Works. Absolute cleanliness is essential to the manufacture of sensitized paper and photographic film to maintain Kodak's high standard of product quality. Of equal importance is Eastman's outstanding reputation as a "good neighbor" to the thousands of citizens who have built their homes in the vicinity of Kodak Park.

After a long period of careful study and comparison of various types of steam generation units and firing methods — including many visits to utility and industrial power plants—Eastman Kodak engineers chose a B&W Pressurized Cyclone Furnace Boiler.

Here are some of the facts you will want to consider about the Cyclone Furnace:

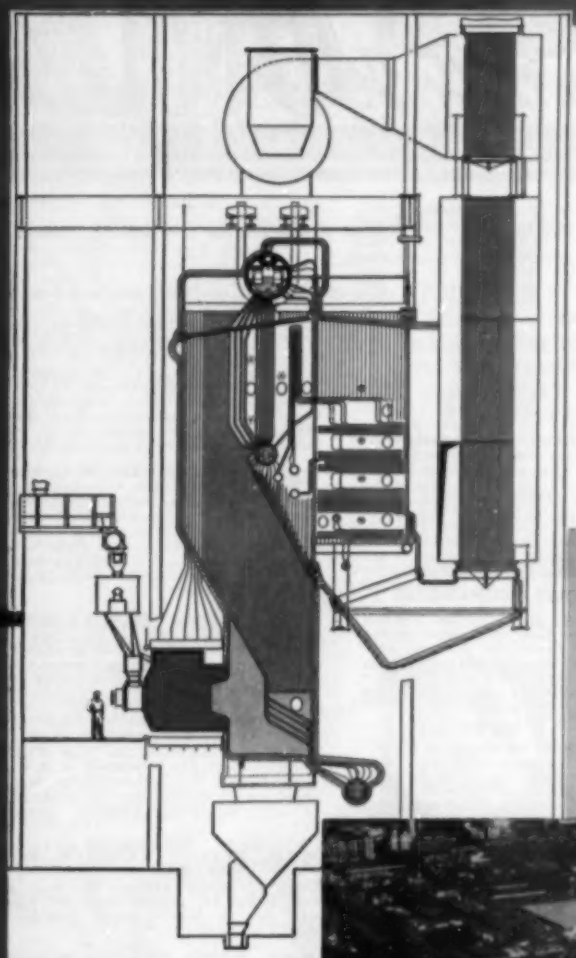
FLY-ASH ELIMINATION—The Cyclone's ability to melt most of the ash to slag in the furnace, holding fly-ash emission to an extremely low level, is vitally important. And with the use of collectors, the small amount of ash that escapes initial melting can be returned to the furnace and converted to readily disposable slag. In addition to cleanliness, this elimination of fly-ash represents substantial savings in ash control, handling and disposal.

SAFER OPERATION—With far fewer burners to light and very fast ignition, the Cyclone Furnace is safe, simple and easy to operate. Combustion controls are greatly simplified.

BURNS A VARIETY OF FUELS ECONOMICALLY—Designed to handle efficiently a wide range of coals including the poorer grades, the Cyclone Furnace is also ideally suited for burning oil or gas. Because it can be switched from fuel to fuel almost instantaneously, no time is lost and advantage can be taken of fuel price fluctuations.

LESS MAINTENANCE—As there are no pulverizers with motors, fans, ducts, and piping, and as there is so little ash in the flue gas to cause abrasive wear, maintenance is reduced, even when normally troublesome coals are burned.

Eastman Kodak is the most recent addition to the mounting list of large industrial and utility companies to turn to the cost-saving advantages of the Cyclone Furnace. B&W's technological knowledge gained through development of and experience with the Cyclone Furnace and many more major engineering advances in steam generation, is available to you at any time. The Babcock & Wilcox Company, 161 East 42nd Street, New York 17, N. Y.



B&W Pressurized Cyclone-Fired Radiant Boiler to be installed in the latest addition to Eastman's Kodak Park Works Power Plant, Burns & Roe, Inc., Engineers. Equipped with two Cyclones, the unit will generate 400,000 pounds of steam per hour and will burn coal or oil. Design pressure is 1575 psi. Pressure at the superheater outlet is 1425 psi, temperature is 900 F.

BABCOCK & WILCOX

BOILER DIVISION

G-650

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48 **BOILER TUBES** — Booklet, available upon request, gives details concerning weights and other data of tubing and pipe, their working pressure scales, and the bending operations used in forming. Useful charts and engineering information. —BOILER TUBE CO. OF AMERICA.

53 **SOOT BLOWING**—Bulletin 1001, 4 pages—Condensed catalog briefly describes Vulcan rotary, retractable, gun-type and manual soot blowers for a quick picture of the complete Vulcan line.—COPES-VULCAN DIVISION, CONTINENTAL FOUNDRY & MACHINE CO.

61 **ASH CONVEYORS** — Catalog, 8 pages—Guide in selection of steam pneumatic ash conveyor systems—description and illustration of special rotary feeders, cut-off valves, furnace doors—information on crushing, conveying and storing of ash, also of metal turnings and reclaimed oil for metalworking plants.— NATIONAL CONVEYORS CO., INC.

62 **STOKERS FOR REFUSE OR COAL** —Catalog 505, 24 pages—Describes and illustrates the Roto Stoker, stationary grate and dumping grate type, both manual and power, for the burning of refuse or coal, or a combination of the two—typical application photographs and engineering data.—DETROIT STOKER CO.

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90 **COMMERCIAL OIL BURNER** — Form 5051 — Presents completely automatic Iron Fireman commercial oil burners for No. 3 and lighter oils, for firing boilers rated from 15 to 65 bhp, capacities from 5 to 20 gal. per hr.—IRON FIREMAN MFG. CO.

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127 **GENERAL FANS**—Bulletin T-155—A general catalog—describes company's complete line of fans, including large commercial and industrial type fans designed to properly ventilate plants and other enclosures, and increase morale and efficiency.—THE EMERSON ELECTRIC MFG. CO.

164 **STEAM CONDENSERS** — Bulletin 102, 24 pages—Describes Conseco steam condensers and gives case studies of their application in outstanding power and industrial plants.—CONDENSER SERVICE & ENGINEERING CO., INC.

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INSTRUMENTS—METERS CONTROLS—REGULATORS

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269 **CONTROL VALVES AND TRAPS**—Bulletin 552 — Describes control valves and steam traps for particular application in the heating, compressing and operating of molding presses in plastic molding. —W. H. NICHOLSON & CO.

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282 **REMOTE READING BOILER WATER GAUGES** — Brochure Co—Covers principle construction and uses of the EYE-HYE remote gage for stationary and marine steam power plants.—RELIANCE GAUGE COLUMN CO.

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348 **WROUGHT IRON WELDING AND CUTTING** — "The Welding and Flame Cutting of Wrought Iron"—Complete information on processes and procedures used in welding wrought iron, with information as to the physical properties of welds. Additional section on flame descaling. Of interest to designers, fabricators, welders.—A. M. BYERS CO.

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403 **VALVE OPERATORS, SPROCKET RIMS**—Bulletin SR—Describes and illustrates adjustable sprocket rims with chain guides, and other forms of Babbitt valve operators and controls.—BABBITT STEAM SPECIALTY CO.

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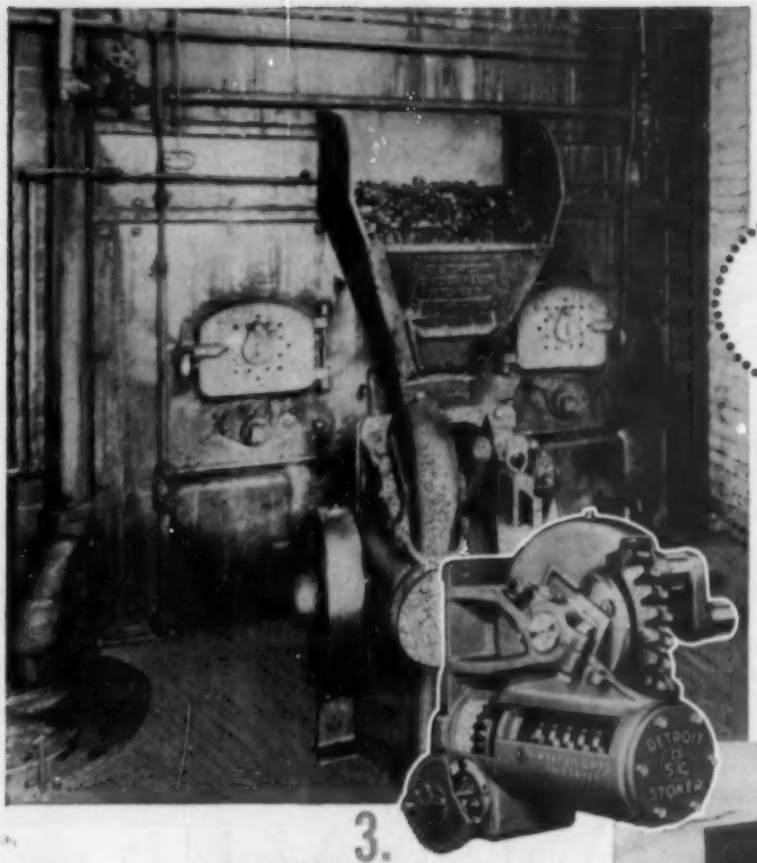

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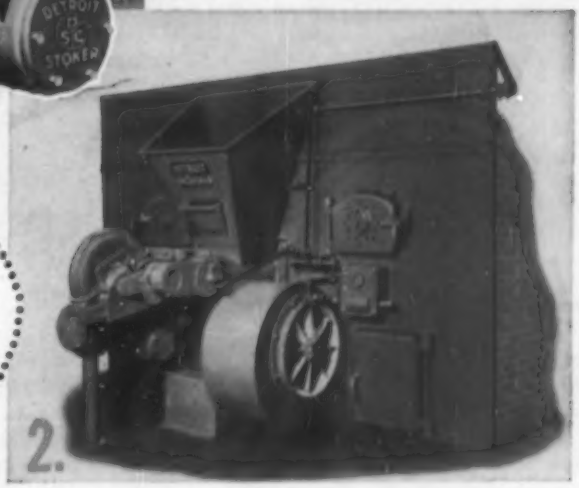

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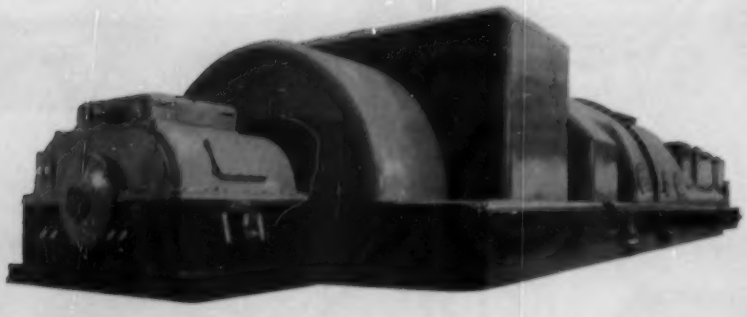

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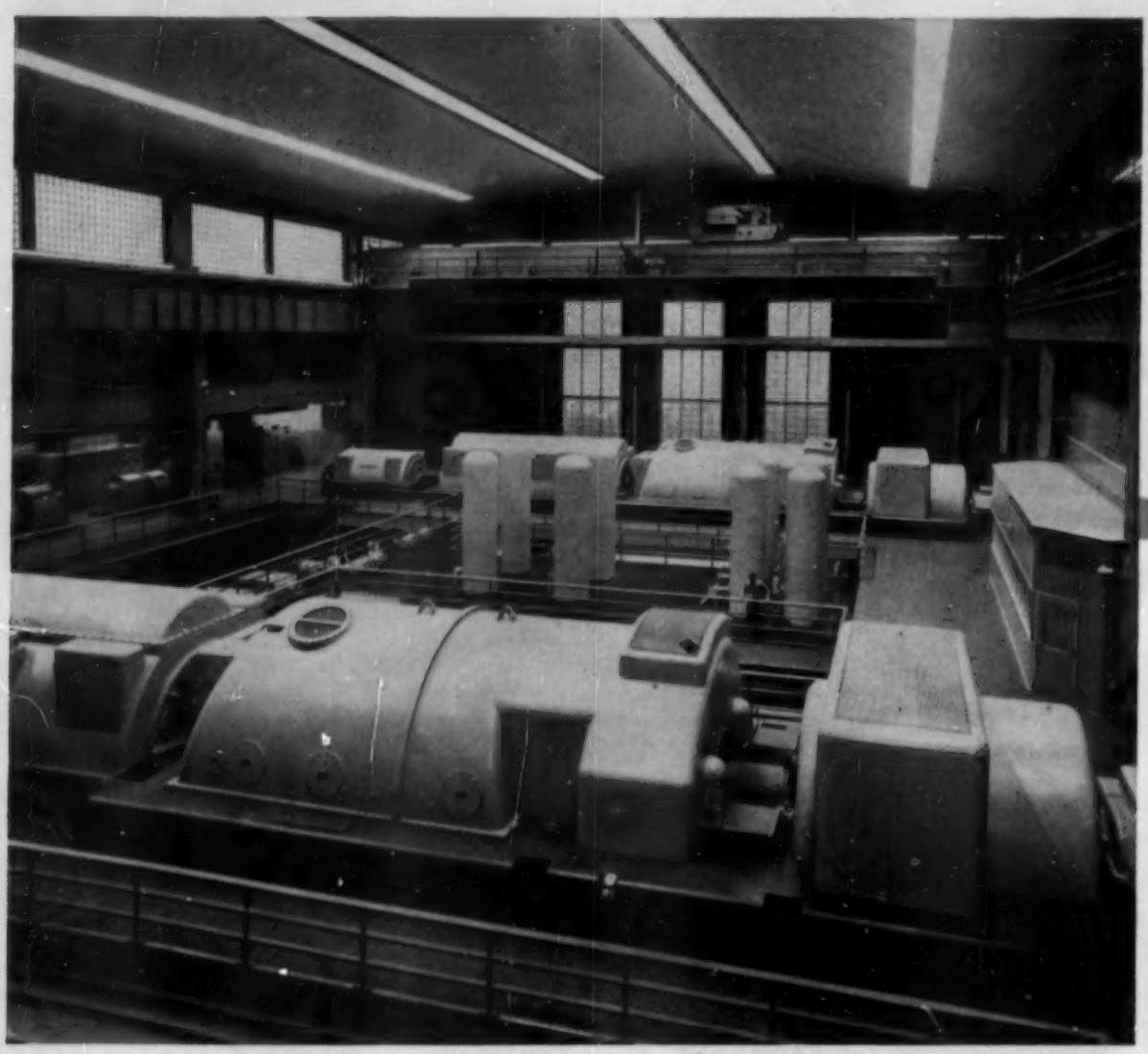

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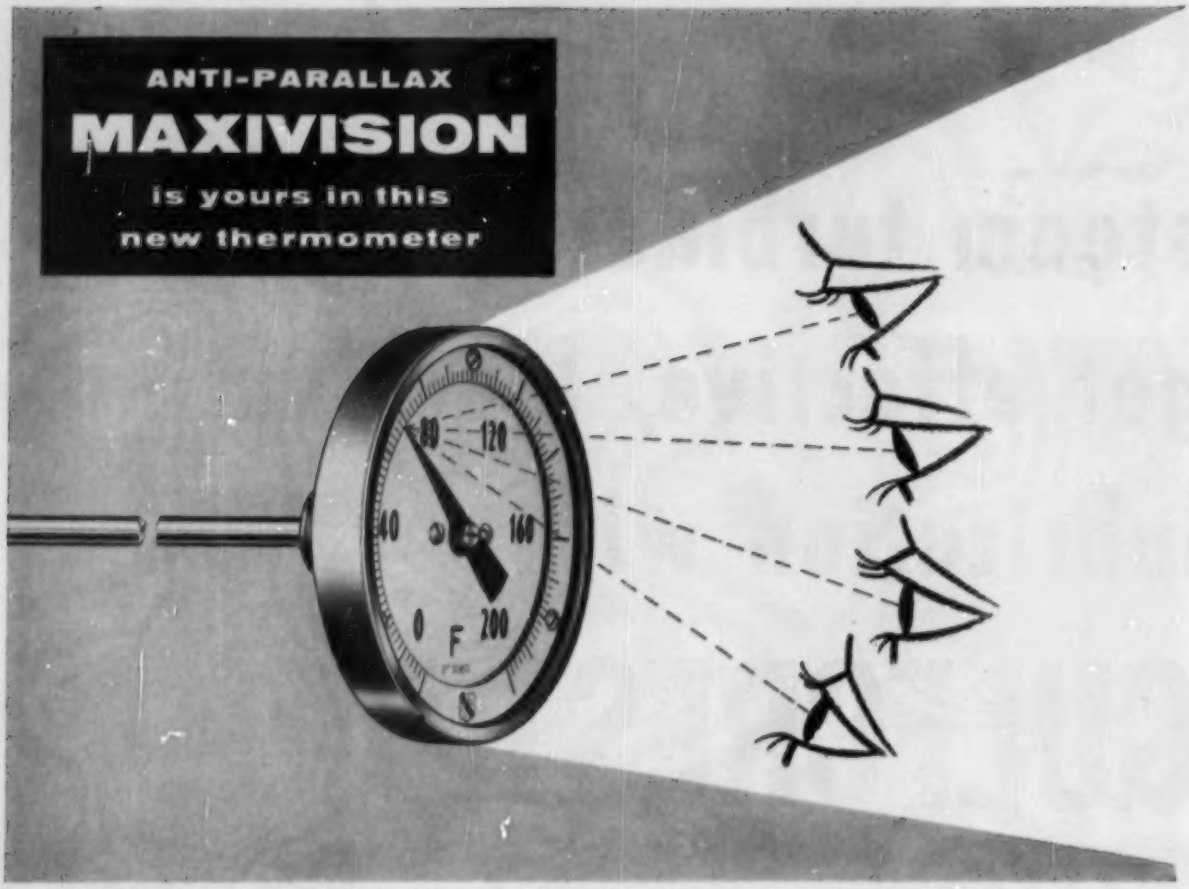

Now you can read temperatures *right at the process* with the same ease, accuracy and economy as pressure readings. The Anti-Parallax Maxivision Dial on this new all stainless steel American Bi-Metal Thermometer assures these important advantages. The large, easy-to-read black figures and graduations are carried on a raised ring set close to the glass, with pointer at the same level. Parallax error is practically eliminated.

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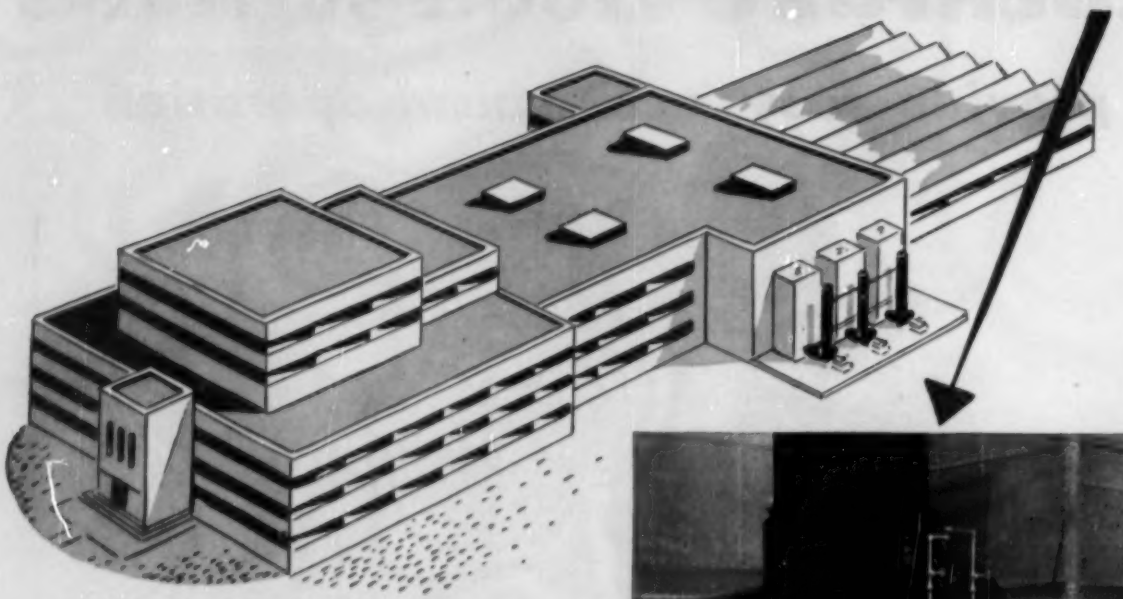

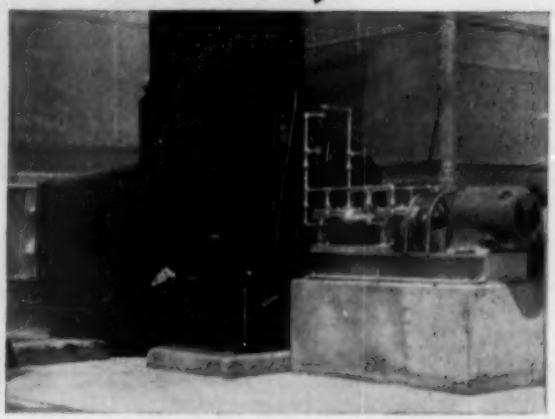

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If you have any kind of a suspension-recovery problem—whether dust, fly ash, fume, fog or mists—it will pay you to bring it to the leading organization in the field . . . WESTERN PRECIPITATION CORPORATION. Western Precipitation not only pioneered, over 44 years ago, the first commercial application of the now-famous COTTRELL Electrical Precipitators, but also has been a leader for many years in the *mechanical* recovery field with its widely-accepted MULTICLONE Collectors.

Result:

Western Precipitation is unsurpassed in the all-important factor of "know-how" in BOTH the electrical and mechanical fields . . . knows from years of first-hand experience whether your particular problem can best be solved by mechanical or electrical methods—*or by a combination of the two* . . . can give you a direct and unbiased recommendation on the matter . . . and then can provide the complete installation under *one* responsibility, *one* overall performance guarantee, even where Combination Multiclone-Precipitator (CMP) installations are made!

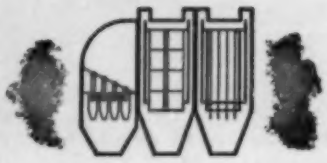
Western Precipitation products and services include . . .

COTTRELL
Electrical Precipitators

. . . the most efficient recovery equipment for high recovery, long life, low maintenance on practically any type of suspensions, wet or dry. COTTRELLS can be designed to handle a few c.f.m. —or millions—with equal ease, and at virtually any operating temperature. Recovery efficiencies closely approach 100% recovery, if desired, with very low draft loss, minimum power costs and negligible labor costs. *By all standards, Western Precipitation COTTRELLS give highest recovery at lowest cost per-year-of-service!*

MULTICLONE
Mechanical Collectors

. . . the most *efficient*, most compact, most trouble-free mechanical equipment for recovering suspensions from gases. Because of their unique small-tube design, MULTICLONES are unsurpassed in mechanical recovery efficiencies—require less space, less maintenance, and are far simpler to install. No filters or screens to replace, nothing to burn or cause fire hazards, no high speed moving parts to repair or replace. These and many other advantages make MULTICLONE Collectors the logical choice on installations where mechanical recovery is selected.



CMP UNITS
(Combination Multiclone-Precipitator)

. . . combine, in *one* compact installation, both mechanical and electrical recovery principles so that maximum benefit is obtained from the advantages inherent in each method. The MULTICLONE section centrifugally removes the largest and heavier suspensions (down to a few microns in diameter) . . . and the COTTRELL section then electrically removes the very small particles remaining in the gases. Thus, the bulk of the recovery is obtained with relatively low-cost equipment, and the final clean-up is obtained with equipment having unusually high recovery efficiency—approaching theoretically perfect, if desired.

The recovery of suspensions from gases is a highly exact science and every problem is different. Some require mechanical methods—others electrical methods—still others a combination of mechanical and electrical methods in proper balance to meet the individual requirements of each application. No matter what your problem, remember that only Western Precipitation has had years of field experience in BOTH mechanical and electrical methods!

Send for descriptive literature!

Let our experienced engineers study your recovery requirements and make an unbiased recommendation on the equipment best suited to your particular problem. A wire, phone call or letter to our nearest office places this unique "know-how" at your service, without obligation.

WESTERN Precipitation CORPORATION

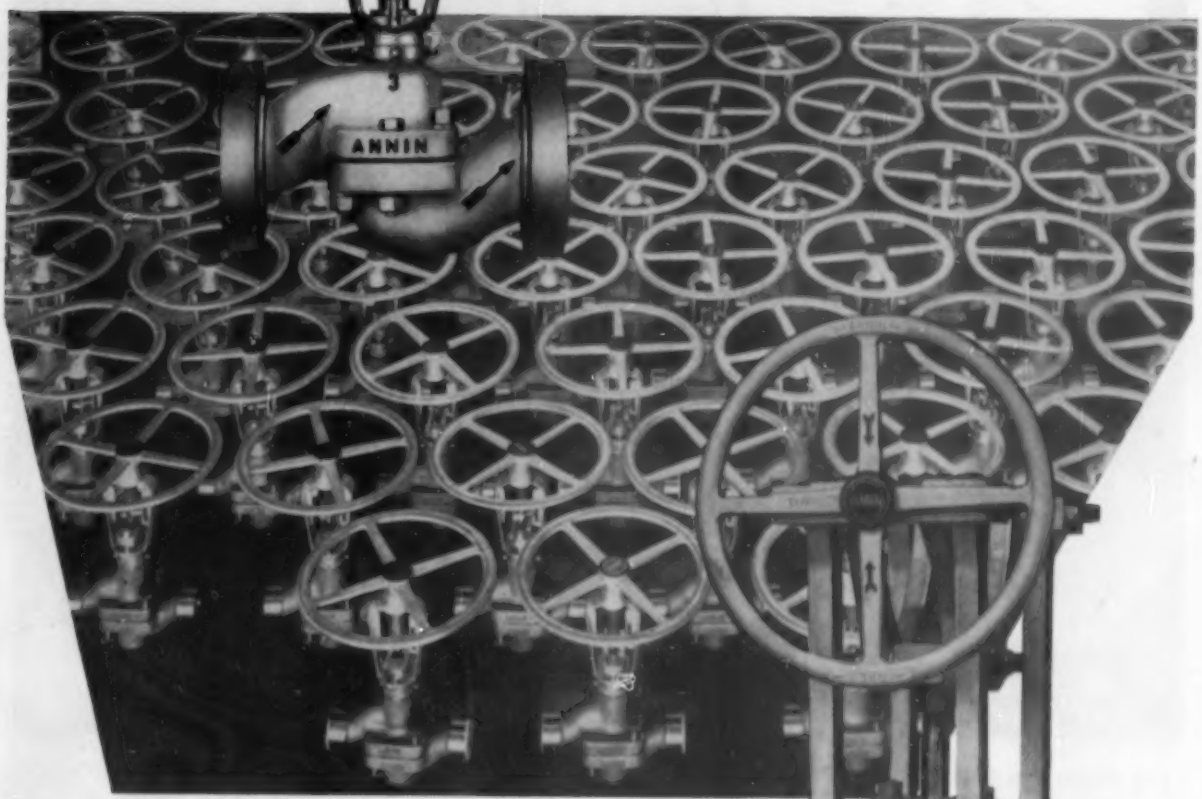
DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF DISPERSED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1052 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 N. La SALLE ST. BLDG., CHICAGO 2
1429 PEACHTREE ST. N.E., ATLANTA 5 • HOBART BLDG., SAN FRANCISCO 4
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

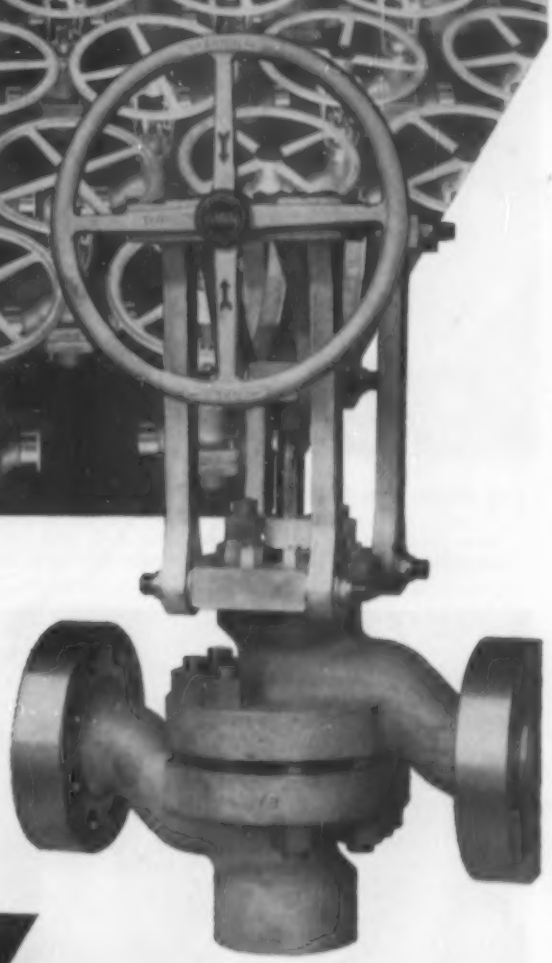
MULTICLONE—T.M. Reg.

THE VALVE *with more than 9 lives!*

THE FINER ALLOYS *PLUS* OUTSTANDING DESIGN MAKE ANNIN VALVES LAST LONGER



Many alloys—Ampco, stainless steel, Annico-20, Hastelloy B and C—will serve you better when given the benefit of Annin's distinctive single seat body design. Annin valves are unexcelled for handling fluids that are erosive or corrosive in severe services. Lost motion between the handwheel and the valve plug has been eliminated. The one piece valve plug and stem is rigidly connected by means of the non-rotating stem lock to the operating screw, forming an integral operating unit. Here, for the first time, precise fluid control and positive closure is available in manually operated valves.



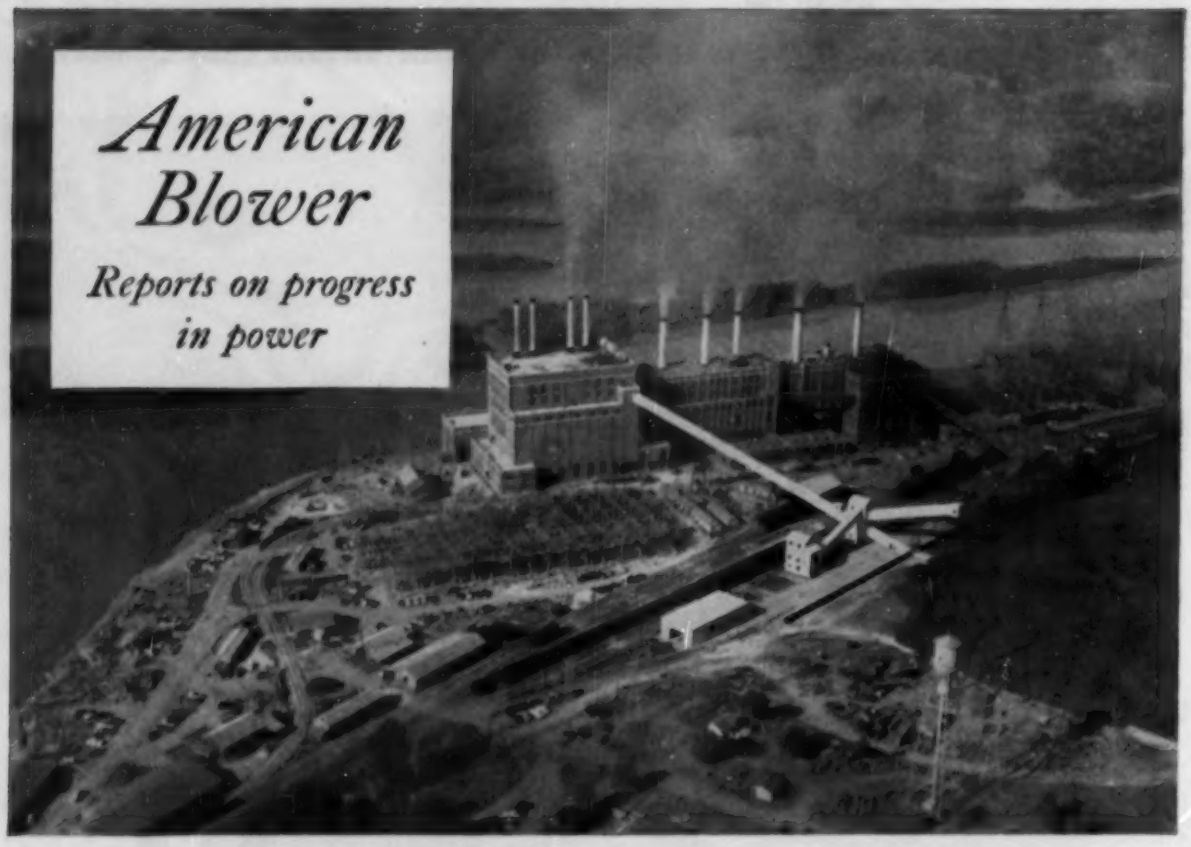
ANNIN *Control* **VALVES**

AND AUTOMATIC VALVES in

for pressures to 30,000 psi

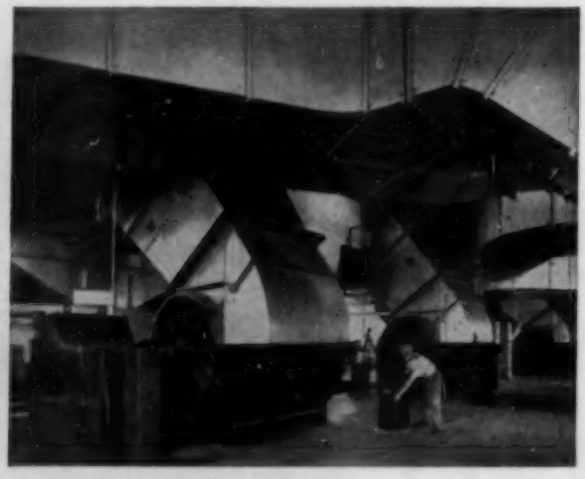
THE ANNIN COMPANY 6570 EAST TELEGRAPH ROAD, LOS ANGELES 22, CALIF.

From a tiny trickle to a mighty



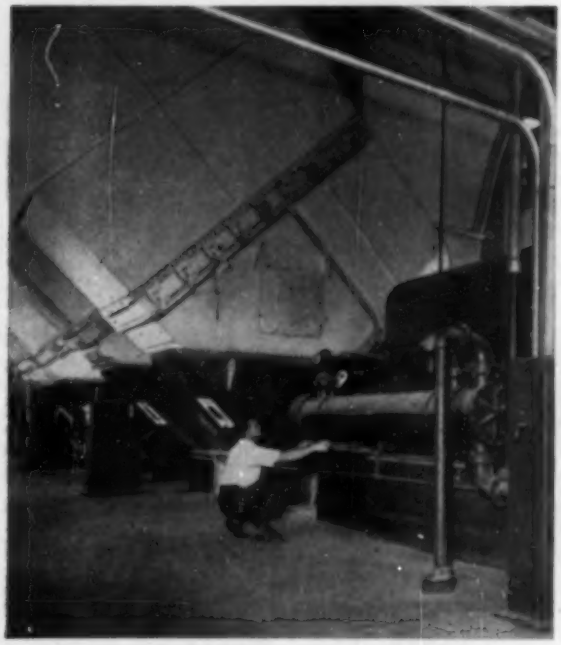
1. Duke Power's Buck Plant (above) near Salisbury, N.C., increased capacity by 250,000 kw in 1953. Two new generating units, recently completed, also added 266,000 kw to the Riverbend Plant near Charlotte, N.C. At the Dan River Plant near Draper, N.C., a new 150,000 kw unit is under construction, to be completed in 1955. Two other Duke Power plants are: Cliffside near Shelby, N.C. and Lee near Greenville, S.C.

2. American Blower Gyrol Fluid Drive – type VS, class 6 – provides smooth, adjustable speed control of a boiler feed pump. It is coupled with a 1750 hp motor in the Buck Plant.

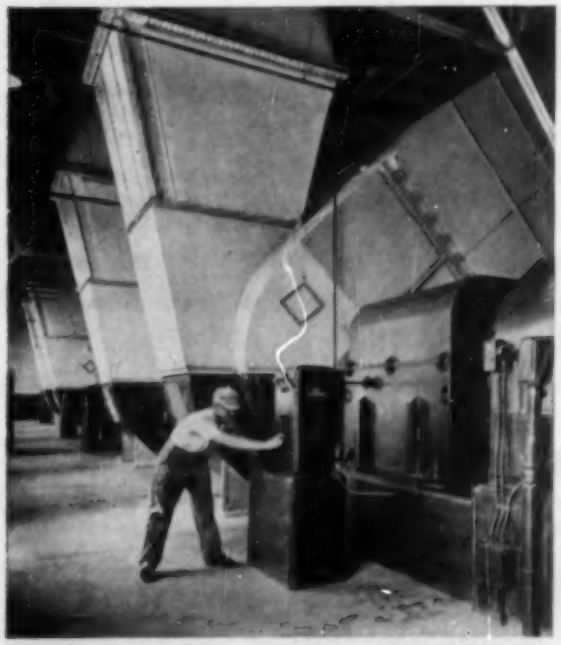


3. Four American Blower Forced Draft Fans are installed in Duke Power's Riverbend Plant. Each has a capacity of 143,000 cfm @ 100°F @ 1180 rpm @ 406 bhp.

2,211,000 kw—that's Duke Power!



4. Duke Power installed these four American Blower Induced Draft Fans at the Buck Plant. Each is driven through a type VS, class 4 American Blower Gyrol Fluid Drive.



5. Rated @ 234,000 cfm @ 296°F @ 637 bhp, each of these four American Blower Induced Draft Fans at the Riverbend Plant is coupled with an American Blower Gyrol Fluid Drive.

In its tremendous expansion, another leading power company chooses American Blower equipment

On April 1, 1904, a power line from a small hydroelectric plant at India Hook Shoals, S.C., was completed to Rock Hill, S.C. This was the simple beginning of the Duke Power Company system . . . a system that today serves over half a million customers in a 20,000-square-mile area in the Piedmont Carolinas — supplying electricity for some 35% of the nation's textile spindles . . . a system that through continued expansion will have an estimated capacity of 2,211,000 kw in 1955!

Planning far ahead of customers' needs is basic to this progressive, investor-owned utility. During the eight years from 1946 through 1953, Duke Power spent $231,000,000 to expand facilities, including $6,000,000 for the South's first steel-tower 230 kw line. Present plans call for additional expenditures, through 1964, of $30,000,000 annually. Duke Power is surging ahead with a dramatic fifty years of generating electricity behind them!

Supplying dependable air handling equipment and Gyrol Fluid Drives is the important part American Blower plays in Duke Power's tremendous expansion. (See pictures and captions.) It's a big role, one that is being duplicated in leading power and industrial plants everywhere.

If *your* future calls for expansion or modernization, talk over your plans and problems with an experienced American Blower representative. He can recommend efficient, economical equipment—including Mechanical Draft Fans, Fly Ash Precipitators, Dust Collectors, Heavy Duty Steam Coils and Gyrol Fluid Drives for boiler feed pump and fan control. Call your nearest American Blower Branch Office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

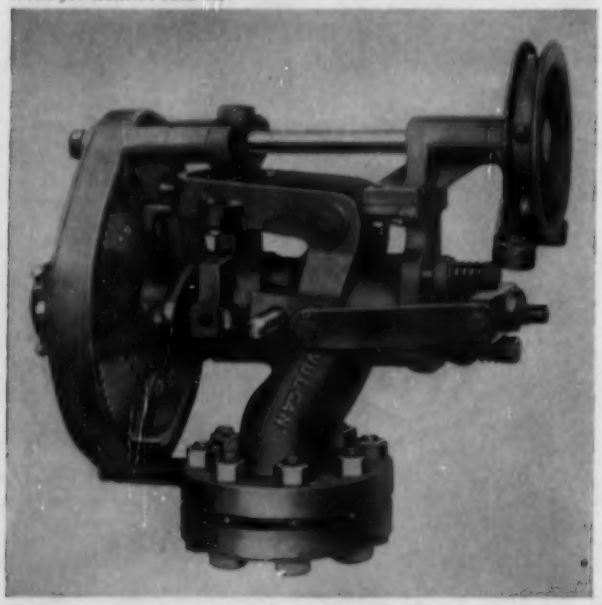
AMERICAN BLOWER

Serving home and industry:
AMERICAN-STANDARD · AMERICAN BLOWER · CHURCH SEATS & WALL TILE · DETROIT CONTROLS · KEWANEE BOILERS · ROSS EXCHANGERS · SUNBEAM AIR CONDITIONERS

VULcomatic E-4 air-operated rotary head for automatic soot blowing. E-4-E has electric motor drive. Either may be cut into service by push button—or operated in automatic sequence. Cleans effectively. Easily installed and maintained.
Write for Bulletin 1006-A.

proved on big BOILERS tops for small

Hand-operated Vulcan P-3 is identical with the VULcomatic E-4 except for drive. In fact, it is quickly converted to an automatic unit by replacing the sheave wheel with an air or electric motor.
Write for Bulletin 1005-A.



You'll find Vulcan Rotary Soot Blowers doing a thorough cleaning job on many high-duty central station and industrial boilers. Their full-pressure cleaning starts at the crack of a valve, and continues through a complete 360-degree arc. Their valves are protected, for corrosive gases are sealed off. Their installation may be at any angle. And all their parts are easily accessible for inspection or maintenance.

You'll also find Vulcan Rotaries—proved on big boilers—are "tops" for small. Whatever your boiler size or pressure—or your method of firing—depend on Vulcan for thorough cleaning and low maintenance.

COPES-VULCAN DIVISION
CONTINENTAL FOUNDRY & MACHINE COMPANY
ERIE, PENNSYLVANIA

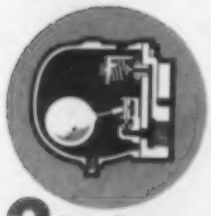
VULCAN Rotary SOOT BLOWERS

1 Sarco Thermodynamic

Valve head, a solid stn. st. disc, is only moving part. Same head and seat to 600 psi. Withstands superheat, water-hammer, corrosive condensate. Cat. 255-A

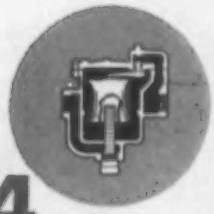
2 Sarco Balanced Pressure Thermostatic

Greatest capacity per dollar cost. Large air venting capacity. Same head and seat, 0-300 psi. Freeze-proof. Cat. 250-A



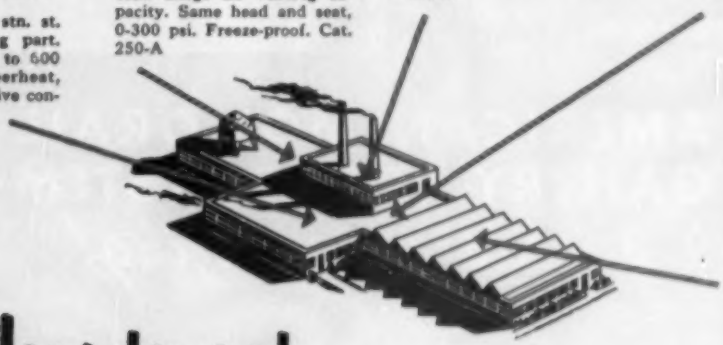
3 Sarco Float-Thermostatic

Discharges condensate continuously at steam temperature and without shock. Responds immediately to varying loads and pressures. Cat. 450-A



4 Sarco Camlift Bucket

New, powerful Camlift valve mechanism permits greater discharge with no increase in size of trap body. Cat. 360-A



5 Sarco Liquid Expansion

Adjustable to discharge condensate BELOW 212°F. Freeze-proof. Not affected by water-hammer or pressure pulsations. Cat. 260-A.

How to get efficient steam trapping ...throughout your plant

With these *5 Basically Different* Types of Sarco Steam Traps you can select the trap with the characteristics that match your *specific* job conditions.

Just because a steam trap discharges condensate and air and closes to steam doesn't necessarily mean it's doing a good job. For maximum efficiency, a trap must also keep conditions within the steam spaces right for the heat transfer job to be done.

For example: A Bucket Trap will work on a unit heater—but its discharge is intermittent. Between discharges, condensate collects in the small steam space of the heater causing undesirable changes in air temperature. The continuous discharge Float-Thermostatic Trap will, however, keep the heating surface free from condensate *all the time*—insure uniform air temperature.

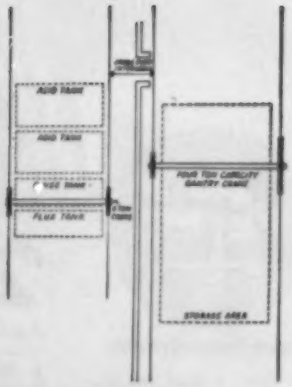
That's why no one type of steam trap can give best trapping results under all job conditions. And that's exactly why Sarco makes 5 *basically different* types of steam traps—each with a different set of operating characteristics.

Solve Your Trapping Problems

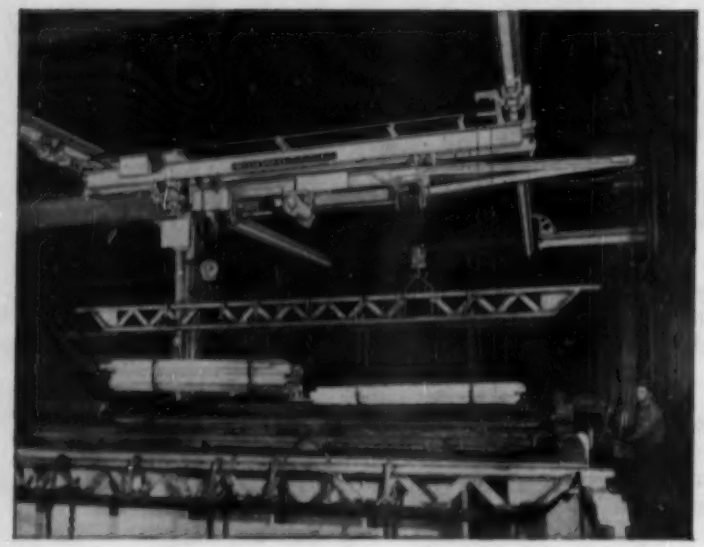
And because Sarco makes all 5 types—not merely variations of one type—you can always get *impartial* advice from Sarco, based on over 43 years of field experience. Write to your local Sarco representative or to Sarco Company, Inc., Empire State Building, New York 1, N. Y.

ONLY SARCO makes all 5 types of steam traps

—not merely variations of one type!



AMERICAN MONORAIL GANTRY CRANE SYSTEM *speeds galvanizing!*



Steel fence posts travel from fabrication to galvanizing over a gantry bridge which interlocks at a crossover track through doorway for passage to the MonoRail crane serving the tanks in the plating room.

All travel on the 4-ton system is motor operated and controlled by push-button station in the operator's hand.

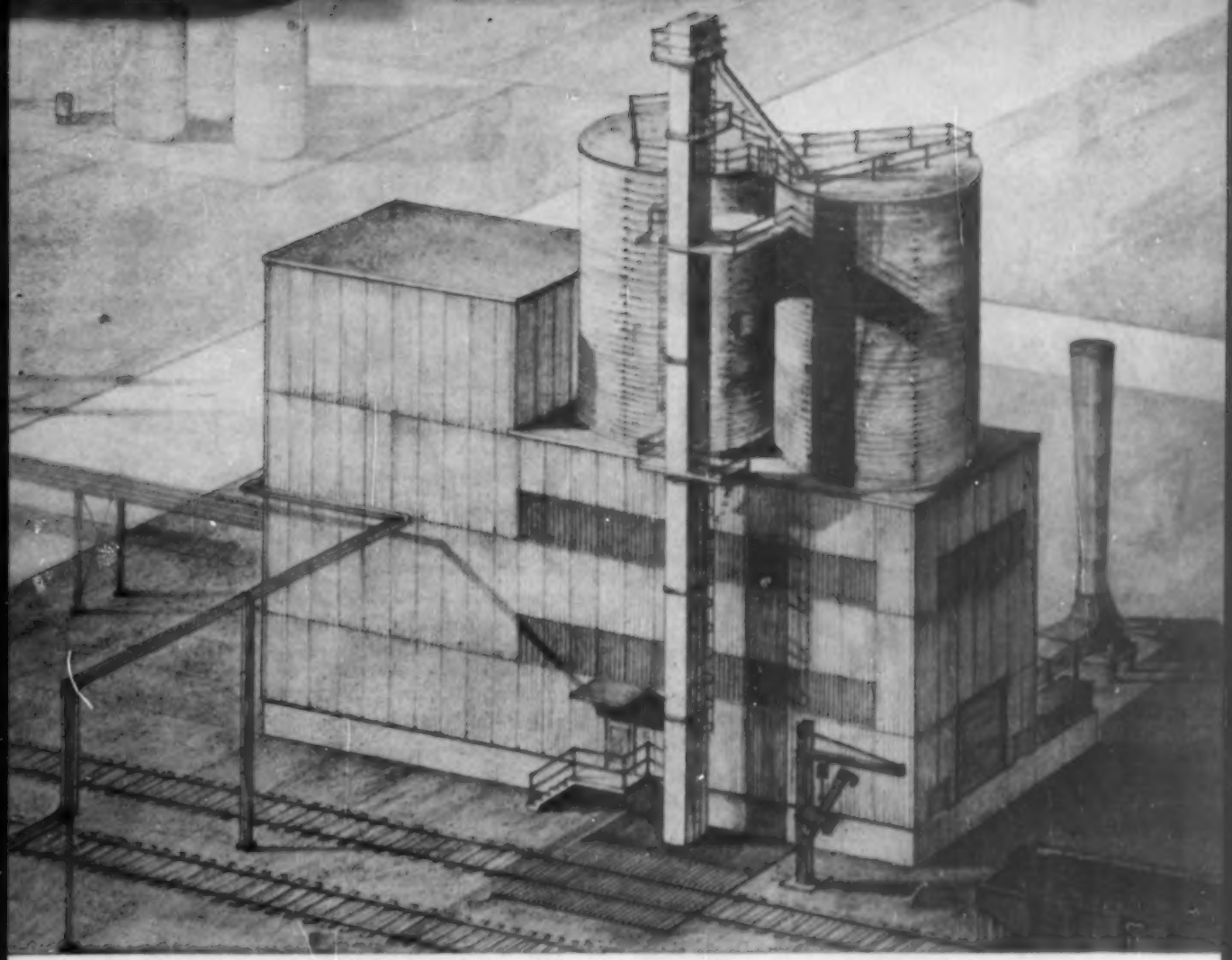
Here is truly team-work handling that results in cost savings as well as increased tonnage through the galvanizing process. It is a typical example of American MonoRail engineering available at no obligation for the solution of your handling problems.

Send for Bulletin C-1 illustrating hundreds of successful Mono-Rail installations.

AMERICAN OVERHEAD HANDLING EQUIPMENT

MONORAIL COMPANY

13105 ATHENS AVENUE • CLEVELAND 7, OHIO



Stauffer Chemical's New Petrochemical Plant Burns Coal the Modern Way

When Stauffer Chemical Co. constructed a multi-million dollar Petrochemical plant in Louisville, Kentucky, the Process Engineering firm of Singmaster & Breyer specified and built a modern coal burning boiler plant (shown above)—incorporating a fully automatic combustion system, completely up-to-date coal and ash handling equipment.

The results? Fuel and labor costs are at a minimum. Dust concentration is well within the limit fixed by the Louisville Air Pollution Control Commission. Initial cost of the plant was $6.38 per pound of steam per hour, compared to an average $8 to $10 for plants the same size. And total cost of steam—including fuel, labor, maintenance, power, and fixed costs—is only 60c per 1000 pounds!

Investigate Your Fuel Costs

If you're planning to modernize your plant or build a new one—or if you are just interested in cutting fuel costs—find out how coal, burned the modern way, compares to other fuels. Talk to a consulting engineer or your nearest coal distributor. Their advice may save you thousands of dollars each year.

facts you should know about coal

In most industrial areas, bituminous coal is the lowest-cost fuel available.

Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar.

Automatic coal and ash handling systems can cut your labor cost to a minimum.

Coal is the safest fuel to store and use. No dust or smoke problems when coal is burned with modern equipment.

Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

BITUMINOUS COAL INSTITUTE
A Department of National Coal Association
Southern Building, Washington 5, D.C.

Super Tough

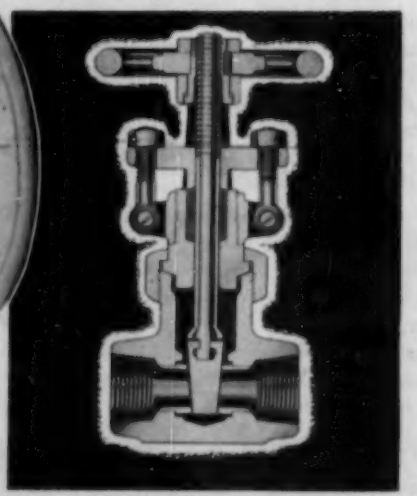
Chapman List 960

Small Forged Steel Gate Valve

Super means "way beyond the ordinary" and that's just what this rugged gate valve is . . . it's tough enough to lick *any* gate valve problem in its range . . . dependable enough to keep maintenance costs down under the most severe conditions. That's why List 960 is specified for more different applications than any other valve of its kind.

Chapman List 960 is tough because . . . wedge faces are hardened to 800 Brinell, so they won't seize or gall . . . seat rings are hardened stainless steel, so closure is always tight and operation is always smooth, without excessive wear . . . stem-and-gate connection is extra-husky to stand up under even unusual stresses.

Specify Chapman List 960 for every use you have for small forged steel gate valves. In sizes from ¼" to 2". Rising stem with yoke (shown) or rising stem with inside screw. Bonnet joint is either metal to metal or gasketed, depending upon application. Pressure range is from 380 pounds at 1000°F to 2000 pounds at 100°F. For higher ratings, specify List 990. Write today for your copy of Catalog 10.



The CHAPMAN Valve Manufacturing Co.
INDIAN ORCHARD, MASSACHUSETTS

TIMELY COMMENTS

COAL and KILOWATTS

. . a significant growth potential for the coal industry

Adapted from comments by **A. C. Monteith**, vice president in charge of engineering & research, **Westinghouse Electric Corporation**, before the **National Coal Association.**

COAL IS BASIC to the continued growth of the electric utility industry. For the past 50 years, the electric utility industry has doubled its production of energy every decade. In October, 1954, the industry reached 100 million kw of generating capability.

The historical rate of increase is expected to continue. There will be about 400 million kw of installed capacity in 1975 and if the traditional rate of doubling every ten years continues, there will be from 1.5 to 1.8 billion kw by the time the year 2000 appears.

Opportunities for Coal in Such a Growth Picture

Electric utilities constitute the coal industry's largest single customer—taking better than 22% of output. The years to come will find an even larger percentage of production going to produce electric power. Today, 50% of all power generated by electric utilities is generated with coal.

There are large reserves of coal and it will be economically feasible to market them for some years to come. This is not true of all other energy sources. With them there is the problem of waning supply which, naturally, brings with it increased cost. The combination of the two, short supply and high cost, cannot help but make way for greater use of coal.

There are going to be some developments that will make it possible to **extract the heat energy from coal more efficiently.** The first electric utility turbine generator used some seven pounds of coal to produce a single kwh of electrical energy. Today, the industry average is 1 pound of coal per kwh, and in a modern station it is down to about ¾ pound.

In years to come, when similar progress is balanced against utility growth and the aforementioned factors of depletion and increased cost of other energy sources, there will still be a big market for coal.

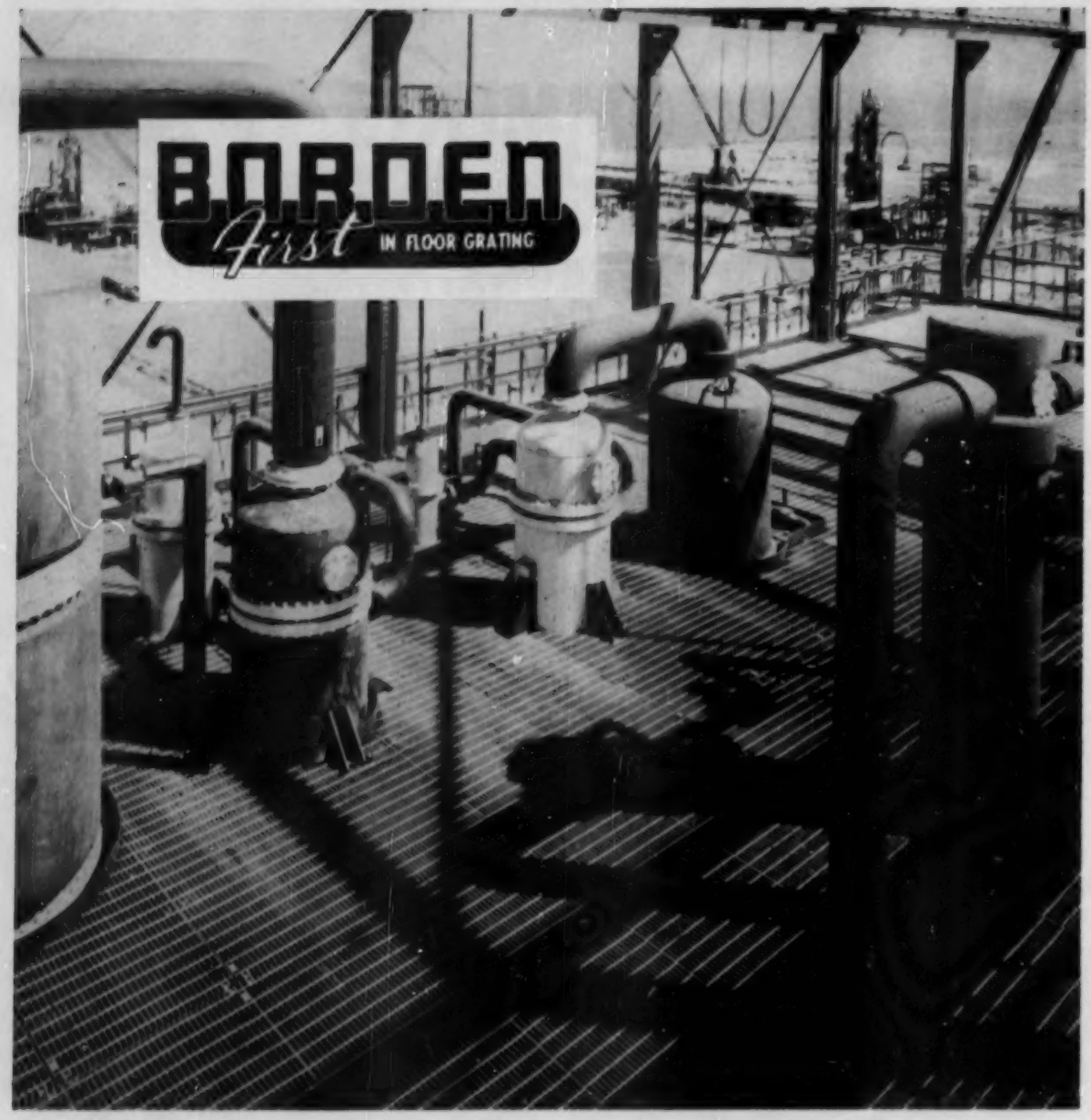
When we consider energy sources available to electric utilities in the near future, atomic power is not a significant factor. It is estimated that in 1963, less than 2% of the power generated will be accounted for by the atom.

Looking ahead to the year 2000 — Various authorities have estimated varying amounts up to 50% of all electric power generation will be accomplished with atomic power. Strange as it may seem, this should not be alarming to the coal industry. Between the present time and the year 2000, the electric utility industry will have continued to grow at a tremendous rate. Again, there will be some developments along the line of efficiency of coal burning plants and some other sources of energy still in the picture. But by the year 2000, the coal industry must be able to produce 6 to 8 times more coal for the electric utility industry than today if it is to meet its responsibilities. This is approximately twice as much as the total coal mined today for **all purposes.**

This suggests a significant growth potential for the coal industry. It constitutes a tremendous opportunity, as well as a serious responsibility.

There are some areas in the United States where coal has had to give economic place to other fuels and to water power. The time may come when these other sources of energy will cease to be able to handle the demands for electric power. It is almost a foregone conclusion that atomic power will be able to compete with coal in these areas if present coal costs persist.

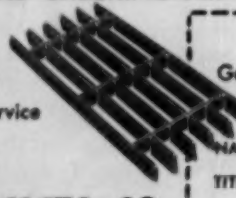
Coal will grow in importance as a source of energy for the electric utility industry only as long as it continues to be the most economical fuel. Nuclear power, like anything else, will ultimately have to earn its place in our competitive system on an economic basis.



Q. How can I avoid costly field corrections when installing floor grating?

A. SPECIFY BORDEN and receive a completely custom fabricated floor grating including cut-outs, toe plates, fasteners and stair nosings. Be sure with BORDEN'S FREE PLANNING AND CHECKING SERVICE.

Write for complete information on BORDEN'S free planning and checking service in this FREE booklet



BORDEN METAL PRODUCTS CO.

853 GREEN LANE ELizabeth 2-6410 ELIZABETH, N. J.
SOUTHERN PLANT—LEEDS, ALA. — MAIN PLANT—UNION, N. J.

BORDEN METAL PRODUCTS CO.

Gentlemen:

Please send me BORDEN Catalog #AT254.

NAME .....

TITLE .....

COMPANY NAME .....

ST. AND NO. .....

CITY AND STATE .....

INDUSTRY SPEAKS

SOUTHERN POWER AND INDUSTRY

Outlook for the South and Southwest

What we have . . . What we need

THE SOUTH may expect to gain several thousand new manufacturing plants employing 100 or more workers during the next two decades. The challenge to the South is to develop programs which will bring about the most desirable expansion of industry in the region as rapidly as possible.

Determining the Location of Manufacturing Activity

Growing Southern Markets—Markets are the determining factor in the largest number of industrial plant location surveys in the South. **The increased purchasing power of the region has attracted more new plants and industrial facilities than any other single factor.**

As the South continues to exploit its rapidly growing industrial economy, improve its agricultural practices, and develop its mineral resources, its proportion of the national income will continue to increase. The South's share of the population growth expected during the present quarter of this century is 14 million persons. This, coupled with its growing per capita income, will make an even more attractive climate for industrialization.

The manufacture of textiles is the South's most important industry, followed by food processing, industries based on petroleum and coal, and the chemical industry.

The latter is particularly important, as the chemical industry has been growing at a rate approximately double that of industry as a whole. The South has one-third of the chemical industry of the nation, and there is every indication that this will increase to one-half within the next ten years.

Finished steel production in the country will increase from 87½ million tons of finished products in 1950 to 135 million tons in 1975, an increase of 55%. The steel industry is confronted with the necessity of expanding by the equivalent of 14 large plants with a total ingot capacity of 31 tons within the next few years. As only the Central and Southern areas can be said to be self-sufficient in their dependence on local ores, it appears that some areas of the South which have long sought a major steel mill will have their desire fulfilled before 1975.

Aluminum consumption exceeds that of all other metals, with the exception of steel. One-third of the country's production is based on the use of domestic ores, and all of the commercial deposits of such ores are in the South.

The **production of plastics** is of great interest to the South as the major portion of the raw materials used in the manufacture of plastics is obtained in this area. A fruitful field for development would be the provision of additional plants in the South for converting the basic raw materials to plastics, as well as for the manufacture of finished articles from such plastics.

A very significant trend is the indicated 170% expansion in the **petrochemical industry** by 1975. Petrochemicals are the backbone of the southern

---

Adapted from comments by **DR. FRANK J. SODAY**, president of the **Southern Association of Science and Industry**, before the recent **Southern Governors' Conference** at Boca Raton, Florida.

Dr. Soday, vice president and director of research and development for **The Chemstrand Corporation** of Decatur, Alabama, reported to the visiting governors the prospects for future development in the South. He outlined the various estimates and analyses concerning industrial expansion and related progress in the South projected through the year 1975.

The Southern Association of Science and Industry, a non-profit, non-political organization founded in 1941, maintains a central research office in Atlanta, Georgia. For a complete copy of Dr. Soday's report—**THE SOUTH IN 1975**—direct your letterhead request to **H. McKinley Conway, Jr., research director, The Southern Association of Science and Industry, 5009 Peachtree Rd., Atlanta, Georgia.**

Southern Outlook (continued)

OUR MAJOR ASSETS—Raw materials and energy sources . . . water . . . transportation . . . new and modern industrial plants . . . industries with a strong technological base . . . growing markets

chemical industry, and over 80% of all of the petrochemical plants in the country are located in the South, particularly along the Texas-Louisiana Gulf Coast. Petrochemicals account for over 25% of all of the chemicals produced in this country today, and it is freely predicted that this will increase to 50% within 10 years.

Petrochemicals are derived from petroleum and natural gas, the South's most important raw materials. It is estimated that the 1955 production of petrochemicals (10 million tons) will require 3.1% of the total petroleum and natural gas production, while the 1975 production of 27 million tons will require 5.5%. The additional plants required for this increased production of petrochemicals will cost $5.2 billion.

The production of **synthetic fibers** is almost wholly a southern industry, and the predicted increase in production from ⅓ billion pounds in 1950 to 4 billion pounds in 1975 (1100% increase) indicates that it will become one of the most important manufacturing operations in this area.

Approximately 70% of the nation's **rayon production** capacity is in the South, and contemplated new plant installations recently announced will increase this proportion even further. This is a logical location for the industry, as the basic raw material is cellulose in the form of cotton linters or wood pulp, both of which are available in almost unlimited quantities in the South. In addition, the mills in which rayon is converted to fabric are largely located in the South. In 1952, 80% of all rayon and acetate produced by domestic manufacturers was processed in the South.

Another important field of expansion is the manufacture of **synthetic rubber.** As the basic raw materials required for its production are readily obtainable from the petrochemical plants located in the Texas-Louisiana Gulf Coast area, it is not surprising to find that the majority of the country's production facilities are located in this area.

People Are Markets—The nation's population is expected to increase from 150 million in 1950 to 200 million in 1975, an increase of 33%. There will be an estimated 63 million households in 1975, compared with 43 million in 1950, while the labor force will increase from 65 million to 80 million during the same period.

The South's share of the indicated population increase is 14 million. The number of households and the available labor force should increase in the same proportion. Changing market conditions due to rapid population growth are expected to create large new demands for such products as textiles and farm commodities, completely altering current surplus conditions.

Huge Mineral Resources in the South and Southwest

The largest group of industries locating in the South are those which are **market oriented.** Another large group includes those industries which are **materials oriented.** These include such industrial giants as petroleum processing, pulp and paper, aluminum, and phosphate fertilizers.

The President's Materials Policy Commission has estimated that the nation by 1975 will need approximately twice the quantity of minerals and similar raw materials now being used. In some fields the growth will be much greater.

The South produces nearly 50% of the country's minerals, and this proportion could be readily increased by the development and use of new prospecting and production methods. Over 2500 different chemical products are obtained from oil and gas. Coal is an equally important basic raw material for the production of a very large number of chemicals.

Anything the southern states can do to expand mineral exploration and discovery will be conducive to industrial progress in the region. Knowledge of the mineral resources of the South is far from complete.

There is the distant possibility that there will be new developments in the field of extraction of minerals from sea water. In this connection, the South possesses important locational advantages, as evidenced by the selection of the site at Freeport, Texas, for Dow Chemical Company's huge bromine and magnesium plant. Similar facilities may be expected to be located along the extensive coastline of the southern states.

The South has already enjoyed tremendous growth of industries using **the pine tree** as a basic raw material. However, this industry is expected to enjoy great expansion before 1975. Annual production of the South's three newsprint mills will be about 480,000 tons in 1955 and about 550,000 tons at the end of 1956. By 1975, this should increase to at least 1¼ million tons annually.

The South must prepare now to develop its forests so that the demands of the future can be met.

Another development that will be essential to the progress of southern industry during the next two decades is a substantial increase in the **use of materials now wasted.** About 50% of the commercial grades of coal are left behind in the ground by pres-

ent mining procedures, and only 50% of the available petroleum is recovered from the average pool. Enough natural gas was wasted in a recent year to supply the needs of 11 million homes.

Increased exploration, the development of more efficient mining and gathering operations, and the increased use of by-products would add materially to the raw material resources of the South.

Develop Industries With a Strong Technological Base

Events are occurring so rapidly in the field of science and technology that it is difficult to predict opportunities and needs a few years ahead, let alone through 1975. Yet the fact remains that technical development in the next two decades will dominate the industrial scene.

In the next decade the South may expect to add some 1,000 new research laboratories, 10,000 scientific workers, and will see the construction of at least 200 new multi-million dollar plants to manufacture products which do not exist today.

The great opportunity for the South lies in the development of industries having a strong technological base. Such industries represent a larger investment per worker, and pay a higher annual wage, than the older and more established industries. Moreover, the South has unusual locational attractions for the most research-minded of all industries, the chemical industry.

Whereas industry in general is expanding at the rate of some 3% per year, the expansion in the field of industrial chemicals over the past decade has been twice as rapid. Of equal importance is the fact that the chemical industry accounts for at least 20% of all industrial production in the United States at the present time.

The chemical industry invests from $20,000 to $30,000 per worker in plant equipment and facilities, as compared with an industry-wide average of $12,000 per worker. Wage and salary rates also are uniformly high.

(1) From the time of the outbreak of the Korean war, one-half of all new chemical plants built in the nation have been located in the southern states.

(2) Chemical employment is increasing faster in the South than in any other area. The region now employs more than 11,000 professional chemists.

(3) The South now has about one-third of the nation's chemical industry, and by 1963 it is expected that this will increase to one-half. There seems little doubt that by 1975 the chemical industry will be centered in the South.

The South does not support industrial research to the extent justified by opportunities existing in the area. Agricultural research is supported much more liberally than industrial research, despite the fact that it is generally agreed that a better balance of industrial and agricultural activity is desired.

Two southern states spend less than 1% as much on industrial research as on agricultural programs. No southern state spends half as much for industrial research as for agricultural development programs.

One of the greatest needs of the South is the provision of a continuing supply of trained scientific and engineering personnel to staff the technical industries being established in such numbers in this region. In the face of a growing need for such personnel, the number of graduates in these fields is steadily declining.

Certainly the South cannot expect to continue to attract highly technical industries unless it can furnish adequately trained scientists, engineers, and technicians to staff them.

Energy Sources and Power

The availability of abundant supplies of energy sources, such as petroleum, natural gas, and coal, has been an important factor in the industrial growth of the South. As the industrial potential of the nation increases, the **overwhelming superiority of the South** in this respect should play a very important part in the location of new industries.

The energy and power requirements of the country will double during the present quarter of a century. Oil and gas now account for 50% of the total energy requirements, and this will increase to 65% by 1975.

The South has 80% of the natural gas reserves of the nation, 70% of the petroleum reserves, and 20% of the coal. The South produces 75% of the country's natural gas, 65% of the petroleum, and 25% of the coal.

Electric power will increase from 389 billion kwh in 1950 to 1400 kwh in 1975, or 260%. The percentage of electric power obtained from various energy sources during this period is shown in the following table:

	Percentage	
Electricity from	**1950**	**1975**
Coal	49	57
Hydroelectric	26	21
Gas	14	11
Oil	11	11

The growth of electric power in the South probably will proceed at a faster rate than in other sections of the country. It has been predicted that electric power generation in this region will expand four times by 1975. Electric utility firms in the southern states are investing $5 billion in new facilities during the period from 1946 to 1956. Since only a small number are of the hydroelectric type, these installations will provide an expanded market for coal, oil, and gas.

Underground coal gasification is expected to be solved before 1975, and will provide a source of synthetic gas from which gasoline can be made. Investigations now under way to explore the low temperature carbonization of coal may open new opportunities for expansion in the region.

Another opportunity for expansion lies in the exploitation of the **low grade coal measures** available

Southern Outlook (continued)

OUR DEFICIENCIES—Industrial and scholastic research . . . production of scientists and engineers . . . market research . . . need for improved coordination of groups working to promote regional progress

in several southern states. The utilization of lignite in Texas is already a reality.

Abundant Water Resources

Nature also has been kind to the South with water, a basic raw material and processing agent for virtually all plant operations. The large annual rainfall of the South, coupled with a long coastline and many rivers, gives it an abundance of water resources.

The experience of 1954 should leave no doubt that conservation and development of water resources is a matter of prime importance in the South. Aside from the fact that water is needed in ever-increasing quantities for public and agricultural uses, water is a prime site-selection factor in many large industries.

It has been estimated that 18 barrels of water are needed in refining one barrel of oil and that more than 250 tons of water may be used to make one ton of steel or one ton of sulphate wood pulp.

The South, with the largest water resources in the nation, is using a smaller proportion of available water than any other section. This availability of water for industrial, domestic, and irrigation purposes may well prove to be the most important resource in this area. It will be a very important factor in the location of new industries.

Closely related to the matter of water supply is the problem of industrial waste disposal. In some of the older industrial regions of the country the pollution of streams is already so great that further industrial development has virtually ceased. In order to take full advantage of its important water resources, the southern states must pursue an intelligent course which will permit the fullest possible use of water while preventing unwarranted abuse.

Transportation System

Water is still the cheapest means of transportation, and no other section of the country has such extensive facilities. Approximately 60% of the nation's navigable waterways are located in the South. Nine of the states reach tidewater, and six are served by the Mississippi river and its major tributaries.

In addition to its extensive system of water transportation, the South has 28% of the nation's railroads and 29% of the highways. In both instances, the South's proportion of transportation mileage is very close to its proportion of the total land area.

Improvements are continually being made in the South's transportation system, even though these activities do not receive wide publicity. The railroads in the region have invested more than $2 billion in improvements since the end of World War II, and are currently spending nearly $300 million per year.

The South is steadily improving facilities for water-borne freight shipments. The agressive port development programs of several southern states are contributing substantially to industrial progress.

Construction of express highways between major industrial centers should be given high priority, since the importance of these facilities in attracting new industry is becoming increasingly evident.

While it is anticipated that many improvements in transportation will take place by 1975, there seems little doubt that heavy industrial products will be transported in much the same way that they are now moved. In fact, considerable effort will be required to prevent a worsening of traffic problems.

Financial Resources

Another important factor in developing new industries is the capacity to provide adequate financing, particularly for sites and buildings. The tax situation today is such that many firms prefer to lease rather than to buy.

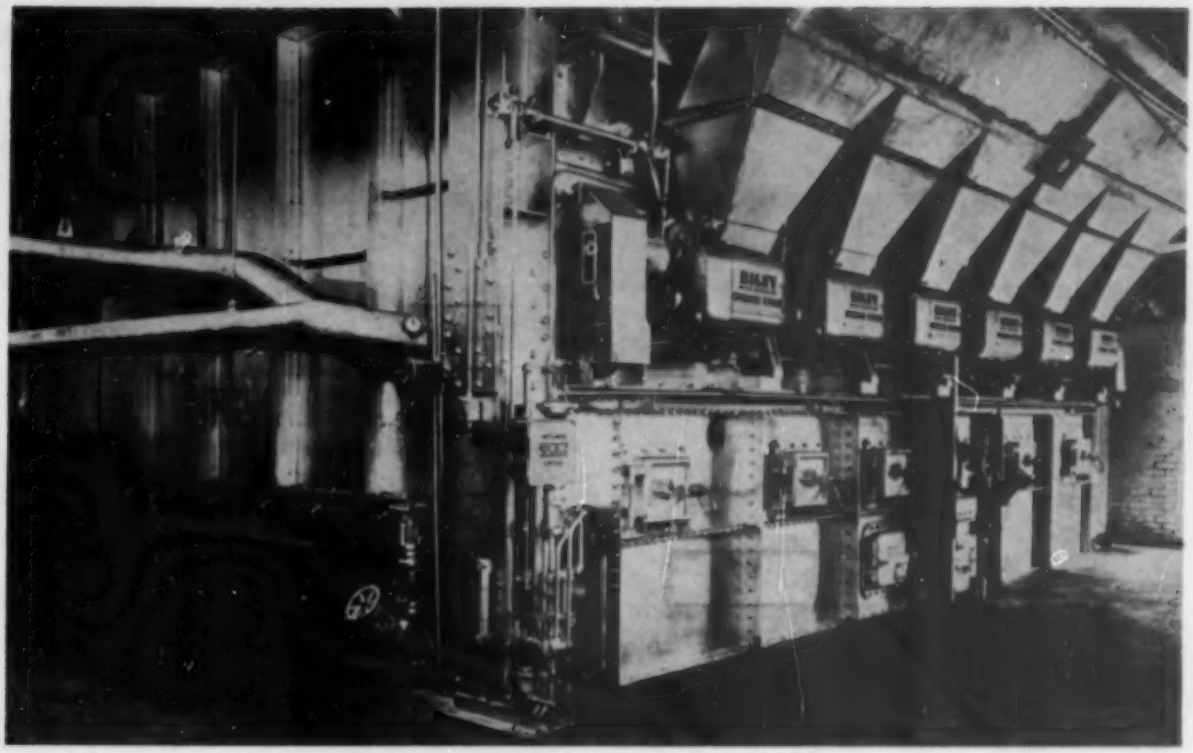
Here we encounter a somewhat unsatisfactory situation, but one which is steadily improving. A rather complete survey made in 1950 showed that of the three main categories comprising business volume—**raw materials, processing,** and **distribution**—the South has more than its share of the first, less than its share of manufacturing in the second, and is deficient in every item in the third category. However, the South has made substantial gains in each category in the past three years.

The Mississippi BAWI plan for the encouragement of industry has received wide attention and somewhat similar plans have been adopted in other areas in the South.

Today, the southern states appear to be almost equally divided among those offering various types of incentives to new industries and those which do not feel that such programs are required. This is a controversial matter.

Southern bankers and business leaders expect to be able to provide adequate financing for the future industrial growth of the region. In fact, the South may well participate heavily in the development of trade outside the area in the next two decades.

The National Association of Manufacturers has estimated that by 1975 the nation will have invested $75 billion in foreign countries, including $40 billion in Latin America. There is obviously a great opportunity for the Southern states to develop increased trade with the nations to the South.



General view of coal spreaders. Bark is fed at a higher level.

Bark and Coal Burned Simultaneously

in Automatically Controlled North Carolina Steam Plant

THE Champion Paper and Fibre Company of Canton, North Carolina, has used bark and wood refuse as boiler fuel for over forty-five years. As recently as 1951 about 25% of the total steam requirement of the mill was supplied by black liquor recovery units, 10% by wood fuel, and the balance by three pulverized coal-fired boilers.

However, steam requirements continued to increase and indications were that soon no standby capacity would be available for the winter months. An increase in the available amount of bark for fuel was also indicated. As a result, Champion decided to install a modern boiler which could provide steam from the available bark and also provide necessary standby capacity.

By HAROLD HANSEN

Assistant Superintendent, Power Department, The Champion Paper and Fibre Company

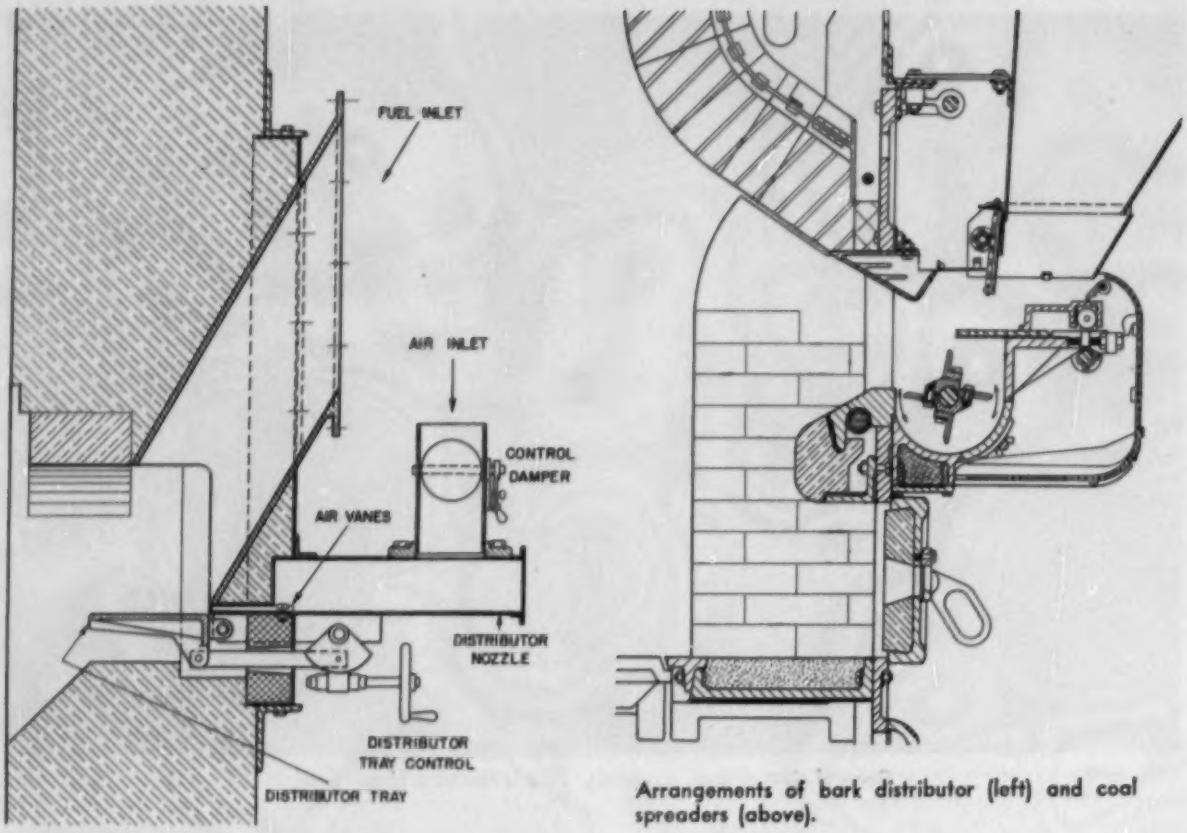
and L. P. COPIAN

Service Engineer, Riley Stoker Corporation

Adapted from a presentation at the Technical Association of the Pulp and Paper Industry's 9th Engineering Conference.

THE MAJOR innovation of this installation is the inclusion of several desirable features into the design of a single modern bark burning spreader stoker installation. Chiefly, these features are: the firing of bark without any form of benefication; the firing of bark directly as it is received from the barking drums without any storage; the firing of bark and coal singly or in combination of various proportions; and operating the unit by automatic controls.

The excellent design and performance of this unit gives to the pulp and paper industries, and others having problems in wood refuse burning, an installation which advances the technique of burning this type of fuel.



Arrangements of bark distributor (left) and coal spreaders (above).

The steam generator is of the two-drum, single pass, baffleless design equipped with water cooled furnace, radiation-convection superheater, continuous tube economizer, cross-flow air heater and a dust collector. The furnace is 24 ft 9 in. wide by 17 ft deep. The height from grate surface to the roof is 38 ft. There are no soot blowers installed, although wall boxes were provided. The arrangement of this equipment is shown in the illustration and general performance data is given in the table.

The forced draft fan is powered by a 250 hp, 1200 rpm constant speed motor and volume is controlled with inlet vanes. The induced draft fan is powered by an 800 hp turbine through a speed reducer unit. Auxiliary air requirements for overfire air turbulence, bark distribution and cinder reinjection are supplied by an auxiliary fan receiving air from the air heater outlet air duct.

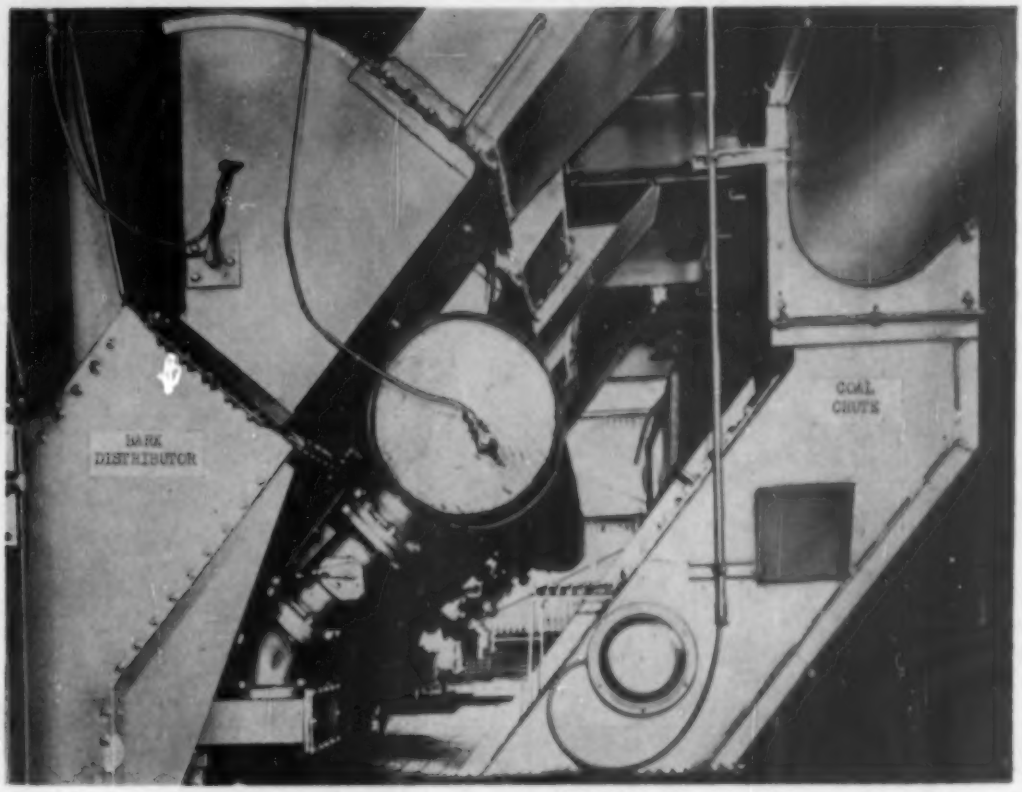
The wood fuel handling system is integrated as much as possible with existing facilities. Bark, stripped from the pulp wood logs in drum barkers, is brought to the bark proportioner by a system of belt conveyors. The proportioner consists of a rotating distributor which receives the bark as it is discharged from the last conveyor belt, and consecutively directs the bark flow down six separate chutes. The rotating distributor is driven through a variable speed reducer by a 3 hp, 1160 rpm electric motor. The speed can be varied from four to fourteen rpm, however, once the optimum speed is determined, it needs no further regulation.

The six chutes which receive the bark lead down to the pneumatic distributors located in the furnace front wall. These spread the bark in the furnace by means of a blast of preheated air. The bark distributors are located approximately 11 ft above the grate surface, thus affording ample time and space for the drying and suspension burning of the bark which is aided by the blast of hot distribution air.

Coal is supplied from an existing bunker and passed, by a system of screw conveyors, through automatic coal scales to the six coal feeders located in the furnace front wall. The feeders are located approximately 4 ft above the grate, which is normal setting for a spreader stoker installation burning coal.

The grate is of the rear ash discharge type, fully zoned to properly proportion air to the required areas. The rear ash discharge type was chosen in order to have sufficient grate retention time to permit extra large pieces of wood refuse to be burned before being discharged to the ash pit. These large pieces of wood refuse may be as much as three inches in diameter and as long as three feet.

Overfire air turbulence is provided by a system of 2 in. diameter air jets, located in the furnace rear wall and ¾ in. diameter jets located beneath each coal feeder. The rear jets, which produce most of the furnace turbulence, are placed 30 in. above the grate surface in order to penetrate and promote



General view of bark distributor.

turbulence in the zone of highest flame temperatures.

The cinder return system is designed for complete reinjection of flyash trapped in the boiler hoppers and dust collector. Flyash resulting from burning bark can be high in combustible content and comparatively large in size. On an experimental basis and as a possible refinement, a standard coal pulverizer is used to grind flyash and discharge it to the furnace through nozzles in the rear wall. Flyash, fed to the pulverizer, includes all the refuse from the boiler hoppers and one-third of the refuse from the dust collectors. The remaining two-thirds of the dust collector refuse bypasses the pulverizer and is reinjected directly to the furnace.

Combustion Controls

The control system design is based on the requirement that the bark must be burned directly, as it is received at a fluctuating rate, and that coal must be burned to supplement the bark, when bark flow drops below a set minimum level or stops completely. This method insures against loss of ignition during periods of no bark flow and is used to supplement plant steam capacity. Since the unit must burn whatever bark it receives, header steam pressure cannot be used as a controlling element. The black liquor boilers in the older plant are in a similar independent situation—burning black liquor as required. Therefore, the function of maintaining plant steam pressure is assigned to the largest of three pulverized coal fired boilers in the old section of the plant.

To obtain this type of control action, the last section of bark conveyor, the section that discharges to the proportioner, has a calibrated weight integrator and scale installed beneath the conveying belt surface. This sends an impulse to the forced draft fan control system, through a corrector regulator that corrects air flow to steam flow. Air flow measurement is taken at a venturi duct section between the air heater outlet and windbox.

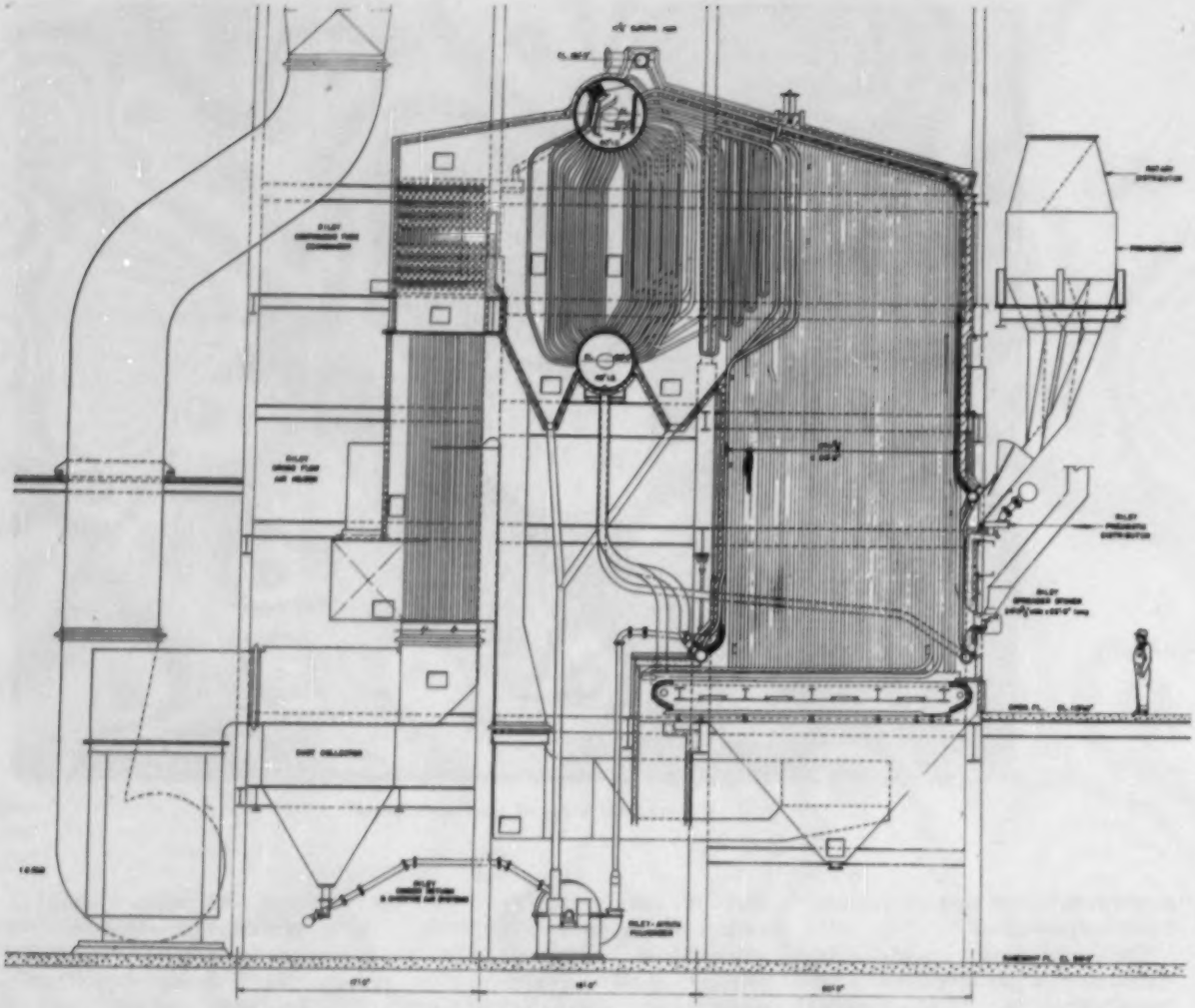
The coal feed rate is established by a splitter relay which balances steam flow and coal feed rate against the minimum load setting.

Fuel-air ratio, coal feed bias and forced draft air bias controls are also incorporated into the system to meet any change in fuel or air requirements.

Boiler feedwater control is of the two element type, receiving impulse from drum water level and steam flow. Remote manual control of the feedwater flow is provided at the control panel. The feedwater is taken from a main boiler feedwater supply line, eliminating the need for separate pumps for this unit.

An oxygen indicator and recorder gives the operator a visual indication of furnace performance.

The induced draft fan controller gets its impulse from furnace draft. Controls were provided on the induced draft fan inlet dampers and the induced draft fan turbine governor. However, after trying various combinations of controlling, it was found that satisfactory



Drawing of steam generator showing arrangement of equipment.

performance for these particular load conditions was obtained by locking open the induced draft fan inlet dampers and letting fan speed maintain the required furnace draft.

Operating Data

The bark flow rate is extremely erratic and frequently flow is stopped entirely. The sizes and quality of the bark is also quite variable. The bark sizing, and the chemical analysis, shown in the table, are the basis of design of the unit. There are periods when the bark is laden with stones and miscellaneous refuse, which cause no difficulty to operation since there is nothing in the bark handling system that can be damaged by them.

The proportioner, which feeds the bark to the pneumatic distributors, handles all the flow rates and sizes of bark with ease. A speed of 10 rpm was found to give good results in feed. The bark chutes are attached to the proportioner in such an order as to feed bark to the six pneumatic distributors in a 1-4-2-5-3-6 sequence. The arrangement provides balanced bark distribution and furnace flame conditions.

The coal supply is an Eastern Kentucky strip mine product having an analysis as shown in the table. Since the operation of the unit, when firing coal only is typical of spreader stoker performance, it will not be discussed here at length; and comment will be confined to firing coal in combination with bark only.

Flame placement in the furnace, when firing wood alone, is towards the rear wall. Flame placement, firing coal alone is toward the front wall. The two fuels in combination, result in even flame distribution from front to rear. This flame is turbulent because of the front and rear over fire air jets, therefore smoke and flyash carryover are low. Another factor favoring low flyash carryover is the unhogged bark. The large pieces are heavier and have less tendency to be carried out of the furnace.

The grates are driven by hydraulic units which give close speed regulation in the range from zero to thirteen feet per hour. For the load settings described below, a speed of approximately three feet per hour results in an ash discharge thickness of from four to

Operating Data for Five Consecutive 24 Hour Periods

Steam Output Pounds Per Day					Bark Analysis		Coal Analysis		
From Coal	From Bark	Coal Input Tons/Day	Bark Input Tons/Day	# Steam Per Lb. Bark	B. T. U. As Fired	Moisture Per Cent	B. T. U. As Fired	Moisture Per Cent	% Combustible in Refuse
1,656,000	3,242,000	82.8	483	3.4	5,080	40.9	13,000	5.0	1.55
1,494,000	3,688,000	74.7	531	3.5	5,070	39.8	13,000	3.5	1.25
1,899,000	3,414,000	94.9	505	3.4	4,860	41.6	13,400	3.5	1.20
1,917,000	3,177,000	95.9	442	3.6	5,230	39.2	13,000	5.5	1.52
1,578,000	3,781,000	78.9	513	3.7	5,100	40.1	11,600	9.0	1.24

six inches. This heavy ash bed is desirable on spreader stokers from the standpoint of operation and results in improved grate life. The ash is loose and friable, regardless of the proportion of the two fuels. Ashpit refuse analysis shows that the per cent combustible is extremely low, resulting in a negligible carbon loss to the ash pit.

The over fire air turbulence system is equipped with an automatic control system to vary air pressure with load. However, with a minimum load setting of 200,000 lb per hour on the boiler, it has been found satisfactory to maintain the rear over fire air pressure at 16 in. (water gauge) regardless of any peak steam flow above the 200,000 lb per hour minimum. Front over fire air operates at the same 16 in. pressure, while the pneumatic distributors operate at 20 in. regardless of bark flow rates. Adjustment is available from the control panel for these systems but under normal conditions, no changes are required.

The boiler hopper cinders are gravity fed to the pulverizer. The dust collector cinder reinjection system operates at 16 in. air header pressure. The reinjected flyash is introduced into the furnace through the rear wall at a level approximately 30 in. above the grate surface and into a zone of extremely high temperature which is necessary for reigniting the flyash carbon.

Although soot blower wall boxes are provided in the boiler setting, no blowers have been installed. Inspection of slag screen, superheater, boiler and recovery surfaces has shown them to be free from all deposits and accumulations.

The increased mass-flow of furnace gases when firing wood compared with coal results in higher steam, feedwater, preheated air, and air heater outlet gas temperatures. However, the maximum difference in temperatures fall within a narrow band of approximately 30 F when burning wood and coal together in various proportions.

The automatic control system regulates the forced draft air and coal feed in accordance with bark and steam flow. The boiler and controls are quickly responsive in maintaining minimum load on coal when bark flow drops off and are also quickly responsive to steam flow increase when heavy bark flow rate provides Btu input above the minimum load setting.

This minimum load has been set for 200,000 lb of steam per hour to meet mill requirements. At 200,000 lb, the steam is produced from variable proportions of bark and coal while above 200,000 lb, all the coal is off and the steam is produced from bark alone. This minimum steam flow dampens out the load swings which the variations in bark flow would impose, and at the same time provides for the plant's increased requirements.

Table Showing Design Data

GENERAL PERFORMANCE DATA	Bark	Coal
Steam Flow, lb/hr	200,000 cont.	230,000 cont.
Steam Flow, lb/hr	268,000 1 Hr.	250,000 4 Hrs.
Steam Pres., psig	425	430
Steam Temp., °F	750	720
F. W. Temp. into Econ., °F	330	330
Forced Draft Air and Auxiliary Air Temp., °F	400	370

BARK ANALYSIS		COAL ANALYSIS	
Moisture	45.9%	Moisture	5.3%
Ash	0.4	Vol. Matter	32.0
Carbon	28.3	Fixed Carbon	52.1
Oxygen	22.1	Ash	10.6
Hydrogen	3.3		
		Ash Fusion Temp.	2300 °F
BTU as Fired	4,730	BTU as Fired	12,500

Results

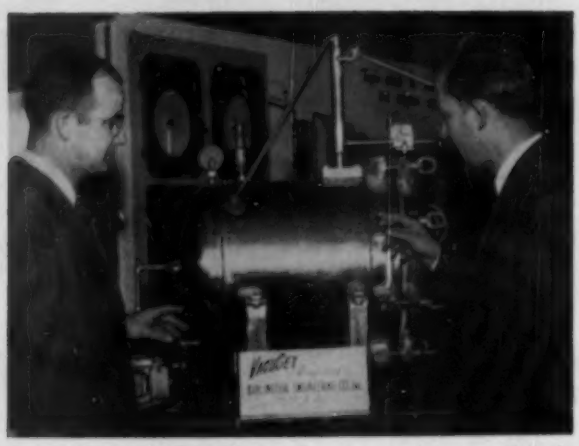
Evaporation figures (steam per lb of bark) were better than anticipated. The bark evaporation rates are derived by assigning a 10 lb test evaporation rate to coal and subtracting the coal produced steam from the total steam generated. Frequent checks have demonstrated that coal scales, coal car weights and bark weights are all sufficiently accurate.

With the control arrangement used, a given steam flow and fuel-air ratio will result in a constant amount of forced draft air input, regardless of the variable proportions of bark-to-coal being burned. The per cent oxygen in the dust collector outlet flue gases varies from a minimum of 3% to a maximum of 7%; the lower percentage occurring at high barkflow rates and the higher percentage occurring at high coal rates. The normal oxygen percentage is within the limits of good performance without requiring further automatic controlling action; however, manual adjustment is available if necessary.

Carolina Conference . .

Proper Automation Improves Product Quality, Increases Profits

By JOHN F. LEE, SP&I Consultant
Professor of Mechanical Engineering
North Carolina State College
Raleigh, North Carolina



MANUFACTURERS displayed some of the newer developments in industrial instrumentation. **Prof. J. Frank Seely**, Department of Chemical Engineering, N. C. State and **Warren C. Gray**, Taylor Instrument Co., Greensboro, N. C.

Process Control and Instrumentation

OVER one hundred engineers representing instrument manufacturers and process industries in the Southeast gathered in Raleigh, North Carolina, in late October to attend a conference on automatic process control and instrumentation for industry.

The conference was held under the joint sponsorship of the INSTRUMENT SOCIETY OF AMERICA and the DEPARTMENT OF CHEMICAL ENGINEERING OF NORTH CAROLINA STATE COLLEGE. This was the first conference on instrumentation held by the Carolina-Piedmont Section of the Instrument Society of America and the response was so encouraging that future conferences are being planned.

THEME of the recent Carolina conference was Proper Automation Improves Product Quality and Increases Profits. Engineers of industrial plants were shown the role of instrumentation in the control of processes and the precise measurement of variables which not only control production rates but quality as well. The economic value of instrumentation in providing an approach to automation received particular attention.

The growing importance of instrumentation in industry was exemplified by the fact that the annual volume of instrument sales has grown from $150,000,000 in 1947 to $429,000,000 in 1953. By 1960 it is expected that the commercial market for instruments will boom to $1,275,000,000. None of these figures include instruments produced for military or governmental purposes. It was also pointed out that most of the instrument market is supplied by smaller companies which are showing phenomenal growth from modest starts. All of these factors should provide food for thought when planning the continued industrial growth of the South.

Equally important to the industrial development of the South is a need for an acute awareness of the contribution of instruments in reducing production costs and improving quality of product to meet highly competitive markets. Too often instrumentation is looked upon as a luxury or convenience when a hard-headed economic appraisal would show far more important benefits.

Instrumentation as a Management Tool

Abstract of comments by F. H. TRAPNELL, assistant plant engineer, E. I. du Pont de Nemours and Co., Kinston, N. C.

INVESTMENT is an essential consideration in planning the utilization of instruments in any process. Besides scrutinizing instruments from the standpoints of investment, labor savings, quality gains, and increased productivity a careful appraisal of the data measured and recorded should be made with a view to future improvements.

Conference speakers, session chairmen and moderators

FRONT ROW: **R. E. Stoveken**, E. I. duPont de Nemours and Company, Camden, S. C.; **H. C. Frost**, Assistant Chief Engineer, Corn Products Refining Company, Argo, Illinois; **Delmas C. Little**, Technical vice president, Instrument Society of America; Army Medical Research Laboratory, Fort Knox, Ky.; **L. A. Schafer**, Secretary, Carolina-Piedmont Section, I.S.A., Instrument Engineer, E. I. duPont de Nemours and Company, Camden, S. C.; **J. W. Lapsley**, Plant Engineer, Celanese Corporation of America, Rock Hill, S. C.; and **E. M. Schoenborn**, Head, Department of Chemical Engineering, North Carolina State College, Raleigh, N. C.
BACK ROW: **Eugene B. Finch**, Symposium Chairman; Instrumentation Engineer, Celanese Corporation of America, Rock Hill, S. C.; **E. M. Seagrave, Jr.**, Textile Division Instrumentation Engineer, Celanese Corporation of America, Charlotte, N. C.; **L. F. Lawrence**, Branch Manager, Minneapolis-Honeywell Regulator Company, Charlotte, N. C.; **F. H. Trapnell**, Assistant Plant Engineer, E. I. duPont de Nemours and Company, Kinston, N. C.; **Albert Sperry**, President, Panellit Corporation, Chicago, Ill.; **Spencer Carr**, Supervisor, Instrument Department, J. E. Sirrine Company, Consulting Engineers, Greenville, S. C.; and **R. D. Webb**, Director of Instrumentation, Carbide and Carbon Chemicals Company, S. Charleston, W. Va.

Too often data are filed in various places without a serious attempt to analyze or correlate results. Data processing systems available today make it possible to gather a tremendous quantity of hard-to-get values which when analyzed and correlated can give top management the essential facts upon which to base plans and decisions.

Problems Ahead

To obtain the greatest benefit of "Instrumentation as a Management Tool" requires some real foresight. It calls for a willingness to gamble on a sizable **investment both in equipment and in trained personnel.** It also requires confidence in the equipment which can be produced today and in the training and experience of our "specialists" in the process control field. Frequently it will also be necessary to go along with design changes to expensive processing equipment. This can be one of the most important factors in getting our processing lines to the point of maximum productivity and realization of the highest possible percentage of top quality production.

There is little question but that the stakes are amply high to influence Management to go after this ultimate in the use of instrumentation along with the other advances in technology available today. Even though a company's product is in a healthy competitive position today, the challenge of the next 10 to 20 years will be for more and better products at lower cost. More output per man-hour will be necessary merely to maintain a product's position, not to mention improving its position or increasing the margin of profit.

Greater productivity will be a must and well planned capital investment in more functional plants, more efficient production equipment and improved working conditions will be the solution. Considerable investment in the training of "specialists" from among the graduates of technical schools must go hand-in-hand with the funnelling of funds into production facilities.

Accelerated research is another must—and this will cost more money. However, among its by-products will be found the training of a good portion of the "specialists" needed and the techniques for making those "hard-to-get" measurements which are needed for optimum process controllability to provide Management with a basis of sound planning.

No Robotization

We have all heard the word "automation" used with increasing frequency of late. To those in the strictly mechanical production fields the "push-button" plant can, and in some cases already is, a reality. Unfortunately those of us in the chemical industry cannot look forward to such a millenium. We can go much further than we have already gone but will not reach a state of industrial robotization.

The frequency of completely changing methods and techniques of processing raw materials, the problems of construction of materials, and the types of measurements required will preclude development of completely automatic lines which require no operators.

We shall have to continue trying to make it possible for each operator to handle greater segments of the production. We must continue the development of product quality control through continuous analysis of both the product and the "goods" in process ahead of the end product step. Automatic control will continue to be used at the various key points in the process but these will be integrated to a much greater extent than in the past, resulting in closer supervision of the operation to achieve greater productivity and improve quality.

Over-All Performance

Automation will be used to a much greater extent for analysis as well as for presentation of information obtained. Some of this intelligence will be used to continuously supervise or reset automatic controllers but much of it may be more useful as part of an information system. From this

AT THE SERVICE CLINIC—**Delmas C. Little**, Technical Vice President, I. S. A., Army Medical Research Laboratory, Fort Knox, Ky.; **E. M. Schoenborn**, Head, Department of Chemical Engineering, N. C. State; and **R. D. Webb**, Director of Instrumentation, Carbide and Carbon Chemicals Co., S. Charleston, W. Va.

Carolina Instrument Conference (continued)

system, which incidentally will probably tie in with plant accounting and production planning, will come the "boiled-down" versions of over-all performance which the plant manager needs. That will be his answer to the question, "What's in it for me?" when he considers additional investments in instrumentation.

Past experience has shown us that industry can and will make the necessary added investment in production facilities not only to increase productivity and improve quality but also to improve working conditions and assure the safety of those employed.

Practically all of the points discussed here are ones which will lead to added investment per person employed. All of the progressive strides we have talked about will likewise require more investment in the training of personnel to design, build and maintain the specialized equipment required.

Selection of Variables for Process Control

Abstract of comments by SPENCER CARR, instrumentation engineer, J. E. Sirrene Company, Consulting Engineers, Greenville, S. C.

INDUSTRIAL processes involve a number of different variables through which the processes can be controlled and regulated—temperature, flow rate, density, pressure, level, conductivity, pH, color, mass, strength of solution, and speed.

These variables may be measured or controlled by mechanical, hydraulic, pneumatic, electrical or electronic types of instruments. Variables are measured primarily for operational knowledge and secondarily for control. It is clear that industry buys and sells materials by the gallon, pound, barrel, or number of units so that accurate, economical and rapid methods of controlling these quantities are needed.

Production rates and quality are controlled by simultaneous control of some of the other variables previously mentioned. Temperature may be determined by means of a thermal expansion, a voltage drop or color comparison. Pressure may be measured by mechanical movement or strain gages and flow, density color, and other variables may be measured by any of a number of very diverse instruments available.

How Many Variables?

In a given process there may be one or more variables, to be considered. The first step is to recognize all the variables. Some may be excluded since they may have no bearing on the characteristics of the process which are to be controlled or regulated.

The second step is to select from the possible variables those variables which have a direct influence on the desired characteristics of the process.

The third step is to select or design instruments capable of measuring or controlling the variables chosen in the second step.

The fourth step is to evaluate the compatibility of the instruments measuring or controlling simultaneously two or more variables in a process.

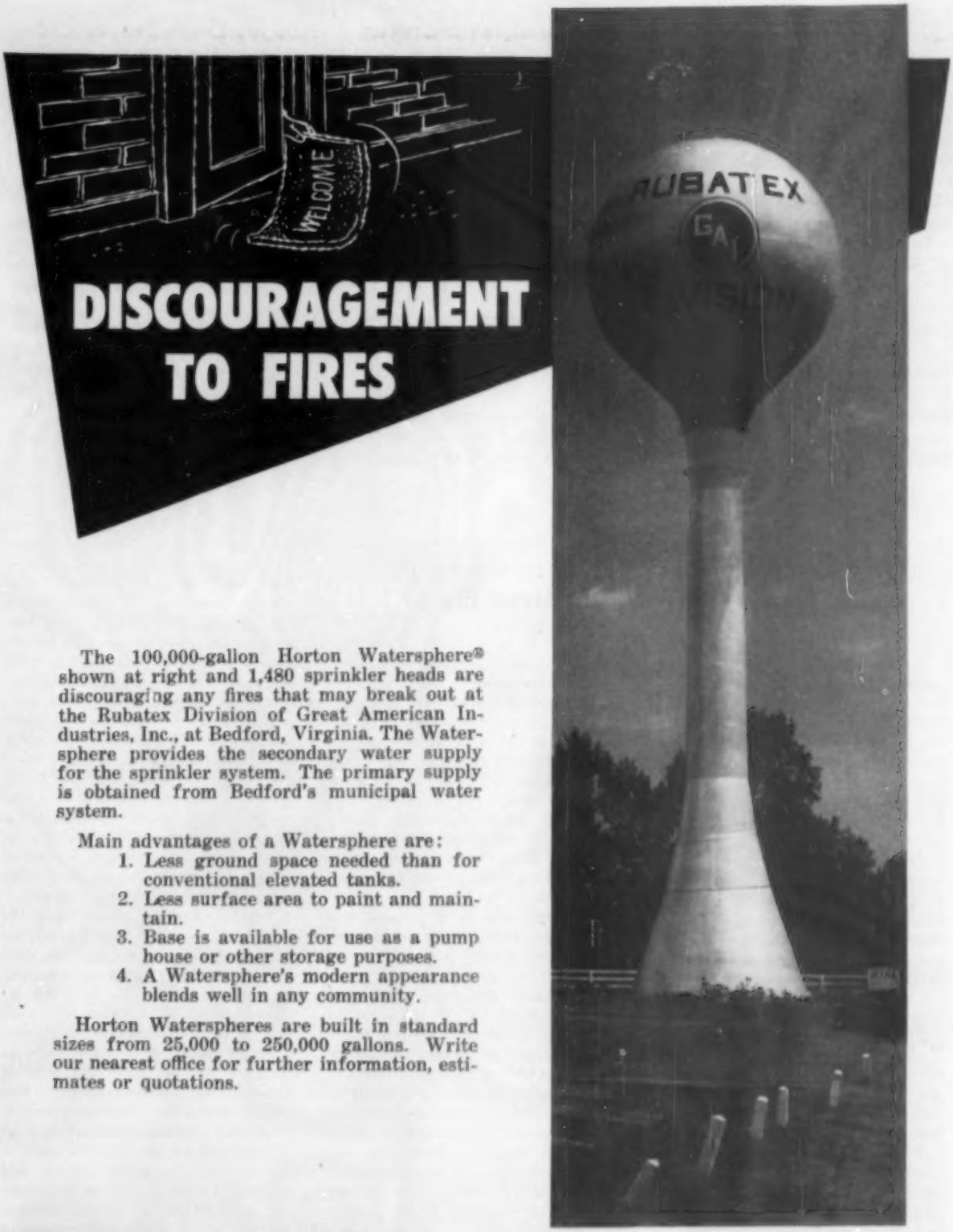
Control Difficulties

Some variables are simpler to control than others. For example, a solution is difficult to control if the strength of concentration is to vary in a particular manner. Similarly temperature control within large masses is complicated by the presence of time lags in the response to the controlling instrument. Another problem which needs to be considered is the corrosive or fouling effect of certain liquids on the accuracy and life of the controlling instrument.

Some variables are independent of all others within a process, others are dependent; as the concentration of a solution will sometimes vary directly with the amount of water added to the process. By knowing these facts, the variable or variables needed for measurement and control can be determined.

Rate of Reaction

But before a final decision is made, another problem must be considered—that is the rate of reaction.



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The rate of reaction is a function of the time necessary for an unbalanced system to come to equilibrium. This rate may be influenced by outside conditions and all conditions must be known before an accurate value can be assigned to the rate of reaction within the process. This may be done mathematically.

The determination of the rate of reaction is necessary for measurement of a variable because primarily the variable is being measured for a definite purpose and the value obtained may be worthless if it is not taken at the correct location. Also, the rate of reaction of a system and the proper location of the variable measurement are essential for the correct application of controls.

The simplest means of measurement is a ruler. The volume of a tank could be determined by measuring with a ruler and calculating the cubical content. Thus the liquid within a tank could be determined.

If the inflow to the tank is to be measured a more complex type of measuring device is needed, such as an orifice type meter. Since the size and cubical content of the tank have already been determined, all that is needed to calculate the flow through an orifice is the time required to fill the tank. Then the orifice may be used to measure the flow to the tank at any one instant. These examples represent only two simple methods of measurement.

Still another factor to be con-

(*Continued on page* 62)

INSTRUMENTATION TERMS

Instrument engineers are having themselves a time with a language as baffling to the inexperienced as jargon of the nerve specialist would be to a garage mechanic.

WHAT DO THEY MEAN?
ARE YOU CONFUSED?

Nearly 4,000 reprints of SP&I's recent eight page report on instrumentation terms have been requested by 161 different companies. A limited number of the reprints are still available and as long as the supply lasts will be sent free to interested parties.

Write the Editor: Southern Power & Industry, 806 Peachtree St., N.E., Atlanta 5, Georgia.

How to Correctly Apply Instruments in the New or Existing Industrial Plant

Mr. Spencer Carr's concluding comments at the Carolina conference outlined preparatory work for instrument design of a proposed process plant. Such a study shows how instruments will give better quality control and lower manufacturing cost.

IN AN existing plant, instruments can be applied to the equipment by the use of certain empirical formulae, and the knowledge gained by running certain tests on equipment to attain necessary data on process conditions. This method does not always give the best results but it does give better results than a hit or miss application.

Three Flow Sheets

For proper application a series of studies should be made. The calculations involved in predicting a process are normally represented on three flow diagrams—**chemical, process, and instrumentation.**

The summary of all process calculations is normally first presented on a **chemical flow sheet.** This drawing should be simple in form and represent an accounting of material and energy additions, changes, and withdrawals. Equipment or tanks are indicated by rectangular diagrams or by simple representative pictures; material flows by simple lines, with arrows indicating direction of flow. Material quantities and physical conditions should be indicated.

For example, a steam coil in a tank could be indicated as being supplied with steam, 150 lb/hr, 50 psig, 300 F. The condensate could be accounted for as water, 150 lb/hr, 212 F. In a simple diagram, all quantities are sometimes indicated directly on the diagram. In more complex diagrams, the point under consideration may be keyed with a letter symbol to a tabulation.

The next step is a **process flow sheet.** This sheet represents the entire process, including every item of equipment, all piping, and all material handling. Equipment is pictured more carefully than in the chemical flow sheet. Every pipe involved in the process is included, with a notation of its size, service, and specification. These design decisions are based on the results of the chemical flow sheet. All valves and other in-line piping items are included. Except for the relative location of the piping and equipment, the process should operate if piped up according to the process flow sheet.

With the chemical flow sheet and the process flow sheet in hand, **instrumentation** may be applied. Process variables are described on the chemical flow sheet, and the piping and equipment are adequately described to locate and size all in-line instrumentation requirements.

For example, the chemical flow sheet may indicate a certain line carrying 2000 lb/hr of gaseous chlorine, 45 psig, 110 F. The process flow sheet will indicate this as a 2" Schedule 80 steel pipe, butt welded, with ammonia type flanges. The information from these two sources is adequate for the instrumentation specifications for the indication or control of temperature, pressure, and flow.

If the instrumentation is fairly simple, it may be combined with the process flow sheet. Transmitters, controllers, and recorders may be indicated, and their connections may be shown by a distinctive line. The chemical sheet should be separate.

Usually, however, it is better to provide a separate instrumentation flow diagram. This will indicate only the piping and equipment affecting instrumentation and control. All instrumentation is indicated with control lines fully represented. This diagram should be complete enough so that, except for space and relative location, the instrumentation and control would function as intended. When the instrumentation flow sheet is completed, the process flow sheet is revised to indicate the piping and equipment changes required to include the instrumentation. It will indicate control valves, orifices, thermometer wells, etc.

From the information established by the chemical, process, and instrumentation flow sheets, piping, equipment and instrumentation layout and detail drawings are made.

In small boilers, too—

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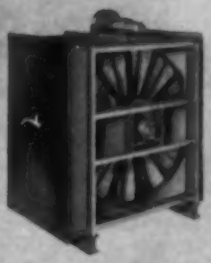

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ELECTRONIC METAL DETECTOR

The Processing Industry's Watchdog

An electronic sentry designed to protect non-metallic products from tramp metal. Control of the equipment is extremely simple.

THE ELECTRONIC metal detector, originally designed for use in powder plants, has found its place in general industry. Today hundreds of the units are controlling product quality and protecting equipment in tobacco, food, plastic, rubber, textile, paper, and many other plants.

The metal detector is an electronic sentry designed to safeguard non-metallic products from tramp metal. It consists of two box-like compartments separated by specially designed spacer blocks to form an inspection aperture or opening. Material to be inspected is passed through this aperture for continuous screening by a high-frequency magnetic field. Whenever stray metal particles enter this field, the resultant disturbance triggers devices which may operate in a variety of ways to draw attention to, mark, or reject the metal-laden portion of the product or even stop the conveyor carrying it.

A completely self-contained unit, the electronic metal detector, is being used in the inspection of materials in both the unfinished and finished state, in bulk or packaged form.

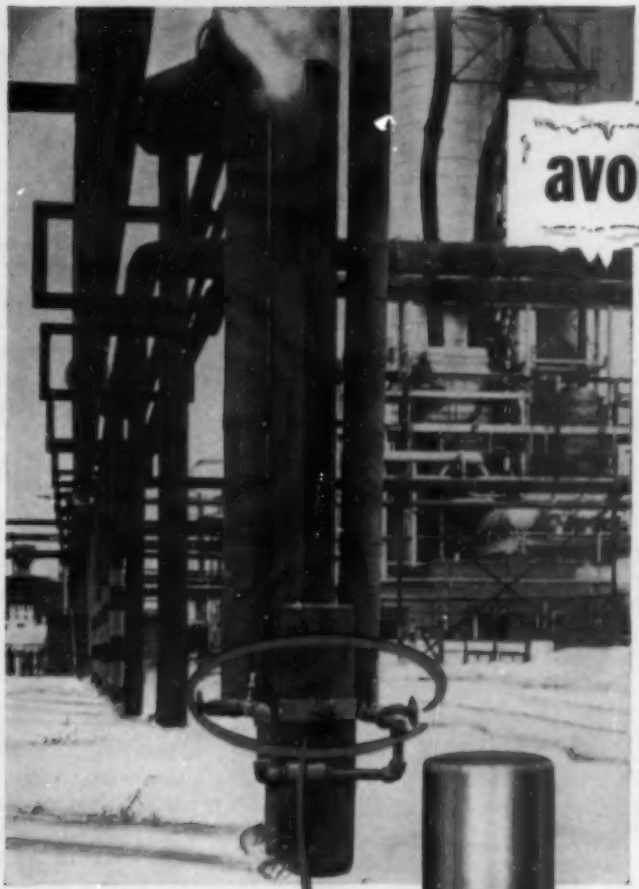
TYPICAL metal detector installation for bulk products is this unit on the uncut tobacco line feeding the shredding machines in a cigarette plant. Metal-laden tobacco is automatically rejected to a conveyor positioned at right angles and located two feet below other conveyor.

Tobacco Protection

A cigarette manufacturer has installed units on its uncut tobacco and on its packaged chewing tobacco lines. An inclined conveyor carries the uncut tobacco through the inspection aperture of the metal detector to a reject conveyor, positioned at right angles and located at a level some two feet lower. The tobacco on the inclined conveyor, if free of metal, drops upon this reject belt and is carried a short distance and again dropped onto a horizontal conveyor system which carries it to the hoppers of the shredding machines. But if the detector indicates the presence of metal within the tobacco as it passes through an inspection aperture, the reject relay of the detector energizes a memory system which allows the portion of tobacco with metal in it to reach the top of the inclined conveyor. Then the memory system causes the reject conveyor belt to quickly reverse itself, accepting the metal-laden tobacco and momentarily running in the opposite direction for a time sufficient to dispose of the metal contamination.

With its time cycle set to allow disposal of the metal-laden tobacco, the memory system again reverses the reject belt and metal free tobacco goes to the shredding machines. Provisions have been incorporated within the memory

By
OTTMAR W. NOESKE
Electronics Section, Milwaukee
and
J. R. NALLEY
Louisville District Office
Allis-Chalmers Mfg. Company



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YARWAY impulse® steam traps

THIS metal detector is used to inspect 100-lb sacks of flour. It was installed near a wall through which the plant's existing conveyor passed enabling it to be used for inspection as well as for moving material to the shipping area.

system to reliably reject a second or third piece of metal if detected while the first piece is being rejected.

On the chewing tobacco line the output of the packaging equipment is fed to horizontal conveyors on which metal detectors are mounted. Utilizing 24 in. wide conveyor belts at 60 fpm, approximately 3100 bundles of 12 packages each are inspected each 8-hour shift.

Because of the erratic flow of bundles, this installation was designed to energize a muted industrial buzzer and red warning light each time metal is indicated. Employees are in position to remove the contaminated bundles.

This manufacturer, following installation of the metal detectors, conducted a 35 day quality control check to determine the amount of metal detected and if possible, from it determine its source.

During a test period, a powerful magnet positioned so as to inspect the uncut tobacco before it entered the metal detector aperture accounted for 3219 pieces of magnetic metal. The electronic metal detector inspecting the same flow of uncut tobacco after passing over the magnet rejected an additional 3292 pieces of both magnetic and non-magnetic particles.

In this plant, the detector inspects 95,000 lb of uncut tobacco every eight hours. Since the detectors were installed, an average of 130 pieces of ferrous and non-ferrous particles are being detected every eight hours and no complaints due to tramp metal have been received by the manufacturer.

Food Packing

A meat packer who initially refused to believe that the detector could reveal even one piece of metal a week in his products permanently installed a unit after its test operation found at least one piece of metal per day.

A food packaging concern installed two electronic metal detectors following an accident in which pieces of broken metal hopper screen contaminated an unknown number of boxes of pudding packaged by the firm.

Since operation of the metal detector is unaffected by the physical position of the inspection heads, it is adaptable to a wide variety of package sizes and conveyor schemes. One candy manufacturer, for example, inspects its products from two converging conveyor systems. Then, too, the detector can be mounted vertically, horizontally or at an angle, to best suit a particular application.

A number of cereal manufacturing plants, inspecting an average of 65 to 70 cartons of breakfast food a minute by means of vertically mounted detectors, use an automatic reject system. On the other hand, a flour mill inspecting 100 lb sacks of flour prior to shipment removes contaminated sacks manually after the alarm sounds and the belt stops automatically.

Plastic Inspection

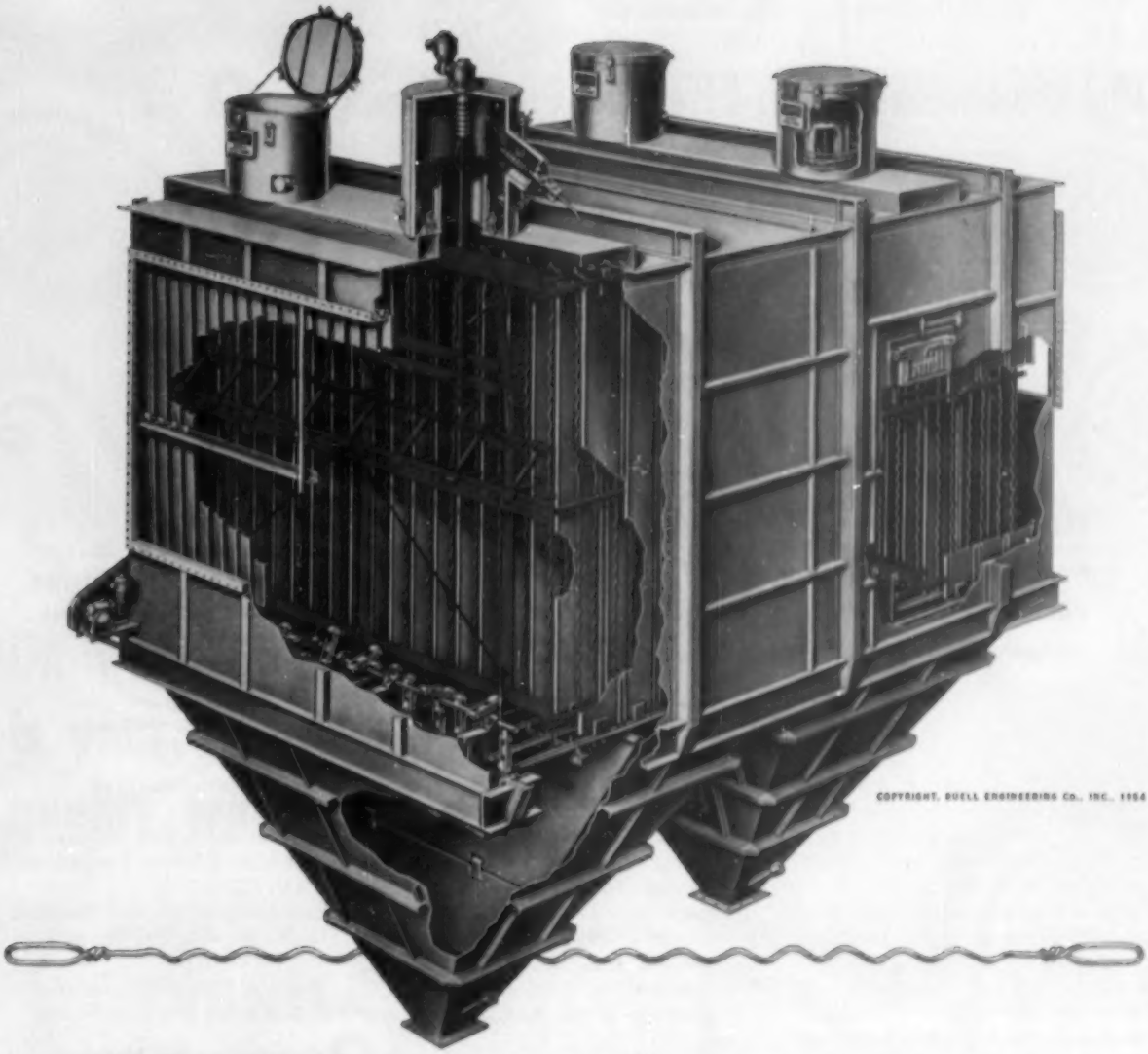
Five metal detectors are used in two separate operations in a plastic calendering plant; three for inspection of rolls of plastic sheet or "pigs" and two for inspection of scrap vinyl plastic bought from manufacturers of plastic garments, toys, etc.

After inspection, the "pigs" enter the final heating and mixing process and are then put on the calender roll mill. Here they are rolled into vinyl film ranging from .002 to .020 in. thick. These calender mills are precision tools and the marring or scoring of their surfaces necessitates shutdown.

Purchased scrap vinyl comes in a wide variety of shapes, sizes and colors. It often contains eyelets, staples, nails, tacks, and other metallic objects. The plastic arrives at the plant in large batches. These are manually color segregated and stored in bins. The plastic is later taken from the bins and used as needed.

Until the metal detector arrangement was worked out, inspection for tramp metal was made visually. This was not a positive means and many particles found their way into the heating and mixing mills and eventually into the rolls where they caused frequent shutdowns.

Metal detectors are also being used to inspect textile materials, packaged textile products, pharmaceutical products, wood scrap, alfalfa hay, roofing tiles, scrap cellophane, shoes, rubber, etc. In any application, control of the equipment is extremely simple.



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The Dimensions of an Effective Plant Manager . . . . . .

Part 1
OPERATION

By TRUMAN E. POUNDS
Superintendent No. 2 Power Plant
The Dow Chemical Company
Freeport, Texas

The duties of the plant manager fall roughly into three main divisions. This, the first of Mr. Pounds' articles, discusses OPERATION. Watch coming issues for his articles on MAINTENANCE and SUPERVISION.

HISTORY tells us that American industry was initially managed by such promotional moguls as Vanderbilt, Gould, and Carnegie during its formative periods. None of these men claimed to be anything other than the promoters that they were. Later, at the turn of the century, industry went through other periods when top management positions were filled first from the ranks of accountants, then lawyers and, finally, business men. Now that our industries and businesses have become much more complicated with the technical problems of the day, the pendulum of supervision has swung toward the engineer.

This is nothing new to those of us who have been reading our technical magazines or those who have had supervisory responsibilities thrust upon shoulders not quite conditioned for such a Gilbraltar of a load. However, since society does look to the engineer for future industrial leadership, it behooves us all to re-evaluate the functions that are necessary for effective plant management.

As engineering students we were of course required to complete the subject of industrial management; however, in most classes the material presented in the textbooks covered only production line manufacturing. Since very few students and young engineers are versed in managerial functions of large process industries, it is the author's purpose to briefly discuss some of the general principles that guide the conscientious plant manager in the operation of his plant.

The Problem

There are of course all sorts of situations in which the young engineer may find himself. He may be selected to manage a new plant under construction and for which an operating organization does not exist, or, he may be replacing a previous plant superintendent who has been retired or promoted. The plant may be a chemical plant, a factory, or a power plant.

With all these possibilities, let us assume, for the sake of discussion, that an organization does not already exist for the new supervisor and that, in this case, the plant in question is an industrial power plant of a large chemical industry.

Functions

The managerial functions to be covered in this and two succeeding articles are as follows:

1—OPERATION
- Orientation of New Manager
- Obtaining Efficient Production

2—MAINTENANCE
- Establishing Effective Program
- Usable Reports and Records

3—SUPERVISION
- Directing Training Programs
- Establishing Work Incentives

Orientation for Manager

The new manager with whom we are concerned may have been employed as an assistant for several years, or he may be moving into the plant for the first time. Regardless of the situation in which he finds himself, he will feel a great need for a vast amount of knowledge which he was not aware that he lacked until the load of the job was thrust upon his shoulders.

The know-how and experience which will account for 90% of this quickly needed knowledge cannot be acquired from office files, text books, or equipment operating instructions. The new manager must therefore initiate his own accelerated training program by walking the plant, tracing lines, locating key valves and switches and, last and most important, getting acquainted with the operators—not in

◀ Heat-treating and physical testing equipment shown at left is used for quality control of welding operators and for development of new welding procedures.

▲ This Rockwell hardness testing machine measures the hardness of weld specimens as a guide to proper procedures for heat-treating of welds.

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▲ A laboratory technician cuts a sample from a pipe weld prior to grinding and polishing for metallographic examination.

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▲ Here a weld specimen is etched to outline the grain structure for further metallographic study.

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Dimensions of a Plant Manager—Continued

When a plant manager asks one of his operators for information, the operator feels complimented—and the manager's knowledge is likely to be greatly increased.

the office but at the operating stations.

A key point which all supervisors should remember when talking to their operators, during the getting acquainted period, is that although the men have great respect for the manager's formal education, they are by no means uninformed, themselves, in the operation of process equipment.

A manager who tries to bluff his men will soon find himself in hot water and without respect in his own plant. Operators know a lot. When a manager asks one for information, the operator is complimented and the manager's knowledge is greatly increased. No man can know it all. Others must be consulted if you are to have an efficient team running the plant.

In respect to the strictly mechanical know-how of operating a plant, it has always been the writer's opinion that a supervisor should know more about the design, construction, operation and testing of any piece of equipment or system under his responsibility than any operator working for him. When the manager has such knowledge of his plant, he will also have the respect of all personnel therein.

Bluffing and negligence on the part of poor operators will automatically stop when they find that the boss knows enough to see through their manufactured excuses. Mr. Charles M. Schwab, who came up through the ranks to president of Carnegie Steel and later president of Bethlehem Steel and U. S. Steel, was this sort of supervisor. We would all do well to pattern ourselves after him.

In addition to the mechanics of the plant and personnel performance, the new manager must also quickly acquaint himself with office routine and the maintenance program. Most of the routine reports will continue to go out without any effort, other than signature, on the part of the new plant head. Maintenance will also, in most respects, continue as in the past. But the new manager may find it desirable to make early changes to suit his own ideas in respect to both of these functions; therefore, he must quickly become completely versed in the work as it is being done.

To summarize the orientation period, it is the writer's opinion that, when initially taking over, the new manager should make it known that all the old policies will remain in effect until further notice. Most everyone, of course, will want to change things to suit his own ideas. Normally, this is desirable, but should only be done after a thorough study of the existing conditions is completed.

The best procedure is to analyze past history and accomplishments, develop an objective or goal, and then proceed with caution unless the urgency of the problem indicates that the bull should be taken by the horns.

Efficient Operations

Managerial responsibilities, according to the text book, fall into the functions of:

(1) planning,
(2) policy making,
(3) organizing,
(4) direct supervision, and
(5) reviewing.

Normally, where a plant is large and the manager is overloaded, he will delegate the fourth function, that is, direct supervision, to one or more assistants, thus establishing a line organization down through the foreman to the operators. This is as it should be, provided a manager does not get too far separated from the details of operation within the plant.

When a manager is too tied down with paper work or too self-important to get out of his air-conditioned office and see the results of his planning, policies, and organization, he cannot expect the full enthusiastic cooperation of his operators and maintenance men. These people like for the boss to see how well they are doing their jobs, and occasionally get a pat on their back from someone higher than their first line supervisor. You may not think so, but without these ego satisfying compliments and inspections, men will just not perform as efficiently as possible. This means money lost.

Materials

In industrial power plants, approximately 70% of the cost of making steam is represented by the money paid for fuel. In some large plants, the total money spent for this one item may far exceed $300,000 per month. Just think what a one per cent increase in combustion efficiency could mean in additional profit.

Losses occur in poor combustion, improper or inaccurate metering, leaks in gas, oil and steam lines, furnace air leaks in boilers, loss of heat through poor or damaged insulation, and just plain negligence on the part of personnel who don't care, or who figure that the boss doesn't care enough to look around for himself.

Teamwork

Basically, the human being wants to do a good job. Train, encourage and compliment him, let him know where he stands and what you expect, and he will work his heart out, providing of course that you inspect his accomplishments frequently enough to let him know that the boss is very much interested in, and recognizes, what a good job he is doing. When operators, maintenance men and supervisors are so treated and instructed on what can be done to eliminate losses and waste, operations will be efficient.

Supplies

Such supplies as lube oils, greases, charts, rags, wrenches, overshoes, raincoats, hard hats, stationery, special forms, light bulbs, soap, towels, etc., also amount to large

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expenditures in the course of a month. It seems unbelievable, but total company expenditure for one item, like Safety Slogan paper coffee cups alone, can amount to thousands of dollars per year if not properly controlled. The efficient manager will therefore want to look at the use of all such supplies, not just when he takes over, but periodically in order to reduce his usage whenever possible.

Competition

Another aid in reducing production cost is to develop cost consciousness on the part of operators. They should be informed periodically on how efficiently their operations compare with past performance and with the performance of other similar company plants. One of the most effective ways of doing this is by displaying the month's unit cost in large graph forms on a permanent bulletin board at a location adjacent to the operational station. This method of communication should develop healthy competition in similar plants and the desire to improve past performance.

Instruction

Of course, by using thought provoking methods of arousing enthusiasm, a manager who is a successful leader will develop in his people the will to perform. They cannot perform effectively, however, if they have not been instructed in proper operational practice. There are of course many tried and proven methods of effectively training operators. The third and concluding article in this series will cover training procedures.

Since some people are prone to say, "So-and-so never told me that," the writer also recommends providing a book of operating instructions covering the general principles of operation of all the installed equipment, and outlining special instructions and safety precautions. Such written instructions will not only help the operator better understand his job, but may actually protect the new manager and the company should a law suit or union grievance develop.

Next month, Mr. Pounds' article will be on the subject of MAINTENANCE.

Carolina Instrument Conference (continued)

(Starts on page 48)

sidered in measurement of variables is a knowledge of the types of measuring devices available. **Temperature measurement** is perhaps one of the more common measurements. Temperature can be accurately measured from −150 F to plus 2500 F, which is well within the range of most industrial requirements. To accomplish this, several types of instruments are used, vapor, gas, and mercury filled thermometer bulbs, resistance thermometers, thermocouples, radiation and optical pyrometers. Each has definite characteristics and the group offers a great deal of flexibility in choice.

Flow rate has a number of instruments for measurement, the majority of which are based on an adaptation of the orifice and are known as differential pressure meters. Volumetric and variable area meters are also used. There are such in-line meters as the standard service water meter and rotometers.

Density of liquids is usually measured by a bubble pipe which detects specific gravity solution.

Level type measurement varies from the simple arrangement of a float and flag gauge to a differential pressure transmitter which will operate either under vacuum or pressure. Frequently an electric probe is used as a liquid indicator.

Conductivity, pH, and strength of solution are usually measured by special electronic circuits that are designed to accommodate the application. They are, however, more or less stock item type instruments.

Speed may be measured electrically or mechanically. However involved the selection of the proper instruments for an application may appear, a standard type of instrument usually can be found.

Control Instruments

From process measurement it is but a step to process control, and it is the logical step to take with labor costs as they now exist. Here again, in order to apply controls, a process must be studied as in the application of measurement of the variable plus the knowledge of the types of control instruments available for control.

Over the last few years, several types of controllers have been perfected to take into consideration, automatically, the rate of reaction in most processes. Usually these types of controllers fall into one of three classes—On-Off, Proportional, and Proportional-with-Reset controllers.

Perhaps the simplest type of control is an On-Off control, consisting of a float valve and a common application is on the make-up line to a tank. The valve turns on at a fixed level and turns off at another fixed level. Hence the control is named "On-Off."

The On-Off controller will fill the tank whenever the level drops and the filling rate is constant. However, the discharge rate may vary. Suppose it is desirable to add a liquid to a tank at the same rate as the discharge. This could be done by using a proportional type controller in place of the On-Off to control a valve in the intake line. Whenever the outflow increases, the inflow also increases in a proportional amount. Were it not for system lag the level would remain constant. Should the tank be of small volume and the discharge is varied suddenly and in large amplitudes, it would be impossible for the proportional controller to maintain a constant level. An additional method of control would be necessary to anticipate this sudden surge. This method is known as Reset. Reset can anticipate sudden surges and corrects for them by shifting the control rate mechanically.

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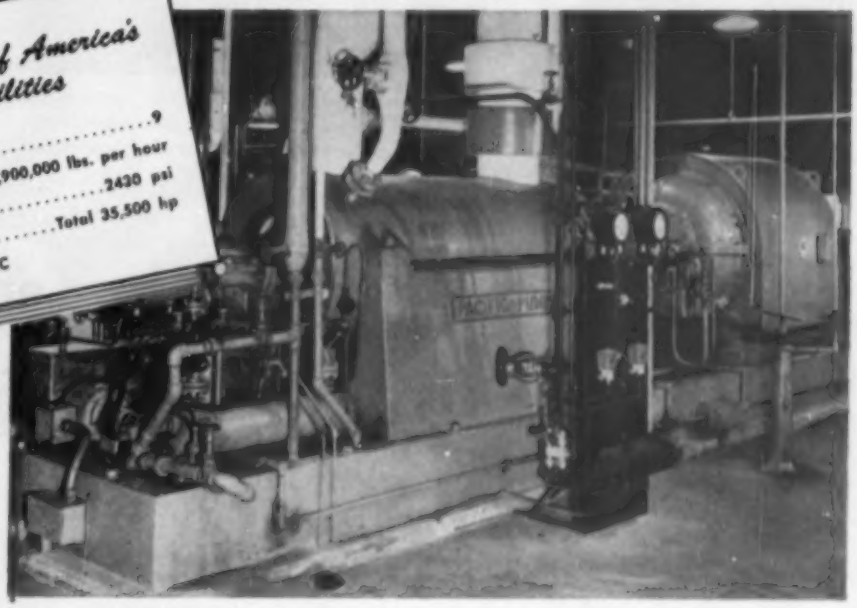

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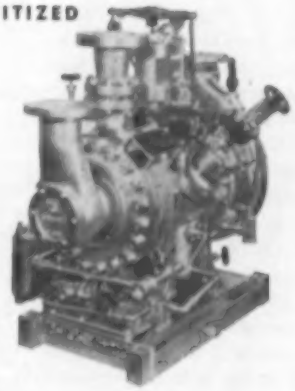

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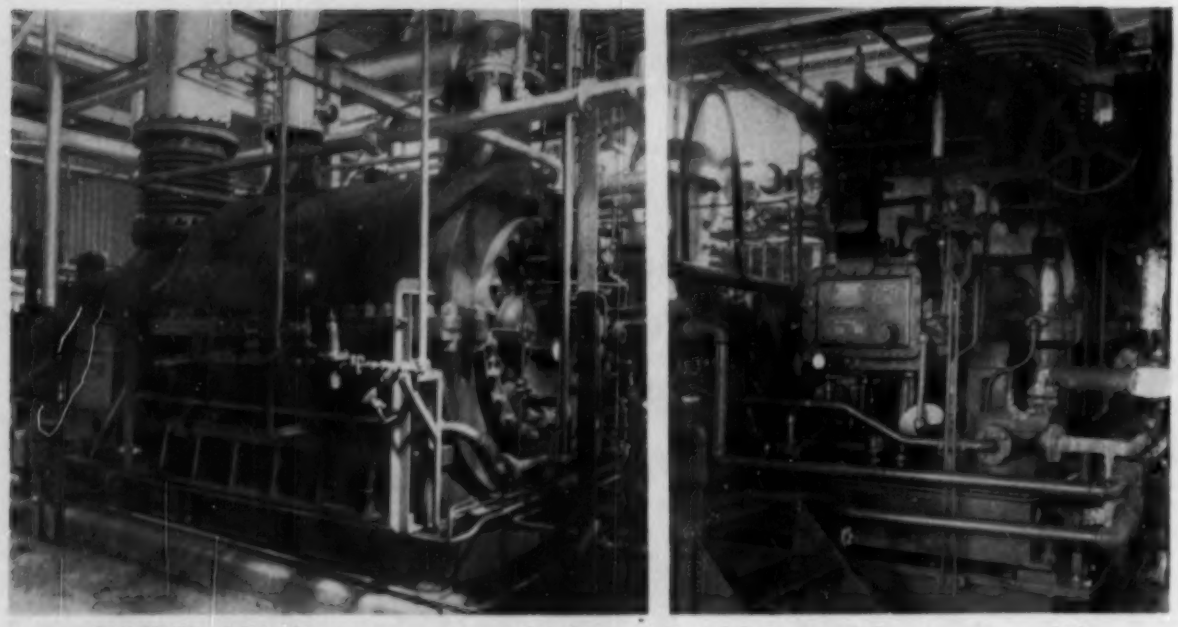


CLOSE-UP of Worthington compressor and turbine. Unit at left is one of the compressors which handles charge gas. Water injection nozzles prevent co-polymerization by controlling temperature. Steam turbine at the right, which drives the propane compressor, produces 7,850 hp when operating at 5,800 rpm.

Five Steam Turbines Drive Centrifugal Compressors in Texas Ethylene Plant

ONE of the country's largest installations of turbine driven centrifugal compressors is a vital part of the new ethylene plant at the Gulf Oil Corporation's Port Arthur, Texas, refinery.

This large installation, designed by the Lummus Company with compressors and turbines furnished by Worthington, is the only ethylene plant known which is delivering its products directly to consumers by pipe line. Some customers are located in the great industrial area near Houston and Texas City, which is upwards of eighty miles from Port Arthur.

This plant also is believed to be the first installation using centrifugal compressors for charge gas compression, water injection for cooling to prevent co-polymerization and multi-nozzle single-casing compressors to accommodate large bleed-in loads at pressure between initial suction and final discharge levels.

Five Worthington steam turbines and one gas expander provide a total of 19,850 hp to turn the five centrifugal compressors. Rotative speeds range from 5460 rpm to 9140 rpm.

GULF'S ETHYLENE PLANT PORT ARTHUR, TEXAS

Fundamentally, the purpose of the plant is to fractionate a mixture of refinery gases (by-products from other processes in the refinery) for the recovery of ethylene, ethane, propylene and propane. The ethane recovered in the original process is cracked again for the recovery of additional ethylene, while still more ethylene is recovered from the furnace effluent and the furnace recycle stream.

Design capacity for this plant is 180,000,000 pounds of ethylene per year from the refinery gases and gases resulting from the cracking of the ethane. These figures are design values based on 330 operating days per year.

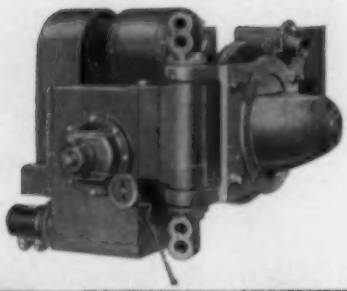
Three of the compressors handle five different charge streams in the process while the other two units are refrigeration compressors providing the refrigeration needed in the process.

Equipment Data

The five Worthington centrifugal compressors, all driven by Worthington turbines, are located side by side under the same roof, which is actually all there is to the machine building. The entire ethylene plant is of the outdoor type, which has proved popular in the temperate climate of the Southwest.

Starting at the south end of the machine building, the first unit is a 4 stage Worthington propane refrigeration compressor, handling 5,230 cfm from 30.5 psia and minus 10 F to 275 psia and 168 F. A 6 stage Worthington Corporation

(*Continued on page* 66)



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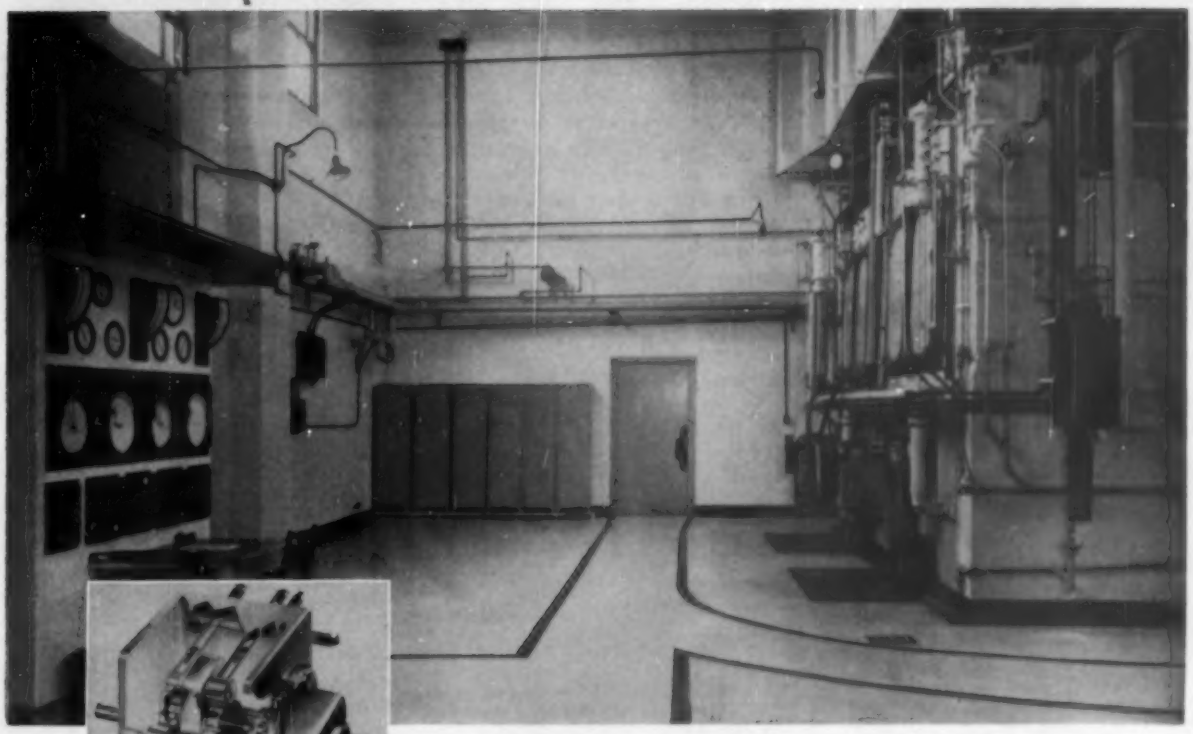

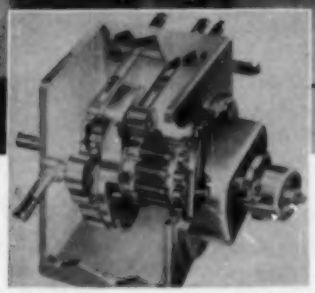

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Actual cash savings of $3500 have been reported by Mr. George Juppe, Chief Engineer. About $500 of this sum is attributed to savings in maintenance costs—an indication of Iron Fireman dependability.

"Our burners have proved very reliable over a wide range of operation," says Mr. Juppe. "Their high efficiency is not affected by variance in the quality and temperature of the fuel oil."

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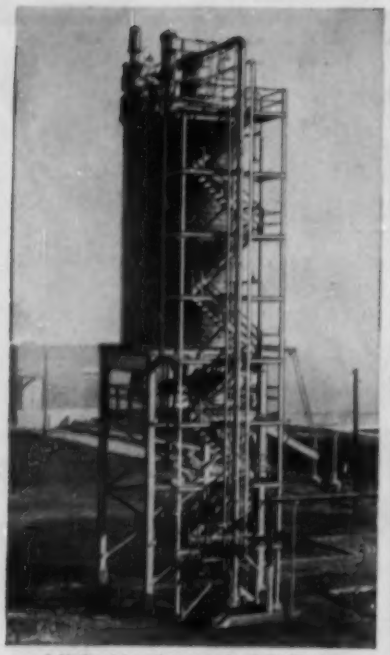

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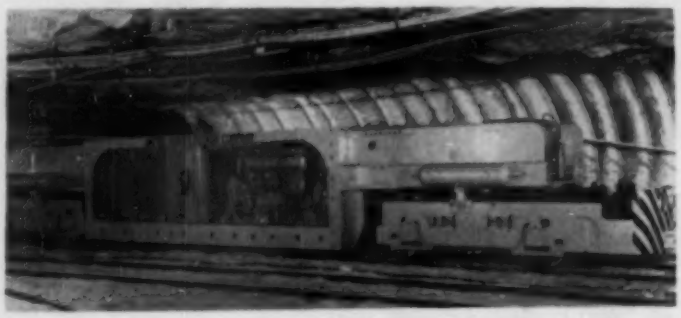
steam turbine, operating at 5,800 rpm, furnishes 7,850 hp to the compressor. Moving northward, the next unit is a 3,050 hp steam turbine driving the 4 stage ethane compressor at 9,140 rpm. The compressor handles 920 cfm from 64 psia and minus 60 deg F to 275 psia and 140 deg F.

Three charge gas compressors complete the installation. In two of the units, water-injection is used to cool the compressed gases to prevent polymerization. Water is injected through spray nozzles into the volute discharge passages. Liquid injection is highly effective. Virtually all heat of compression can be removed, with saturation of the gas as the sole limiting factor.

Steam to operate the turbines is supplied from a central steam generating plant serving the entire refinery. Conditions at the turbine throttle are 210 psig and 160 deg F superheat. All units are operated condensing at 4 inches of Hg absolute.

Since part of the process required a reduction in pressure for a portion of the charge gas, an expander turbine was installed to make use of some of the energy rather than resorting to a wasteful throttling process. Charge gas at 700 psig and 20 deg F is expanded to 140 psig and minus 70 deg F thus realizing 720 hp from what would have been a wasteful expansion.

Necessary refrigeration is provided by the two remaining compressors in this large installation. A closed refrigeration system using propane as the refrigerant operates at three different cooling levels, minus 10 F, 18 F, and 49 F. In this system the propane is recycled and condensed against water, while the ethane system is of the open type using ethane as the refrigerant and then rejecting it to the process.



Car-High Diesel-Electric Locomotive Puts Out 420 hp for New Mexico Underground Potash Mine

A locomotive, not much higher than an automobile and believed to be the most powerful underground diesel-electric in the world, is operating at the U. S. Potash mine, Carlsbad, New Mexico.

Built by the General Electric Company's locomotive and car equipment plant, the locomotive is just 6 ft high, over 47 ft long, and was built for high underground speeds in the haulage ways of the Potash mine. It can travel 37.5 mph and its length and weight probably make it the largest underground diesel-electric built to date.

Taking advantage of every possible inch of mine clearance, 420 hp was packed into this 40-ton locomotive which, successfully and snugly, negotiates the mine's underground burrows in record time.

Unusual size was necessary to accomplish underground work without hooking up locomotive units in tandem. The Potash locomotive is capable of pulling 800 to 1000 tons on a level track depending on track conditions.

A special exhaust-gas conditioning system reduces the temperature of the engine gas exhaust from 1000F to 160F or less by "scrubbing" the gases in large water tanks.

To get the locomotive into the mine, it had to be dismantled and reassembled underground. There was no other way of getting it through the mine's main opening—a shaft measuring just 46" by 66" except by lowering it into the mine in pieces.

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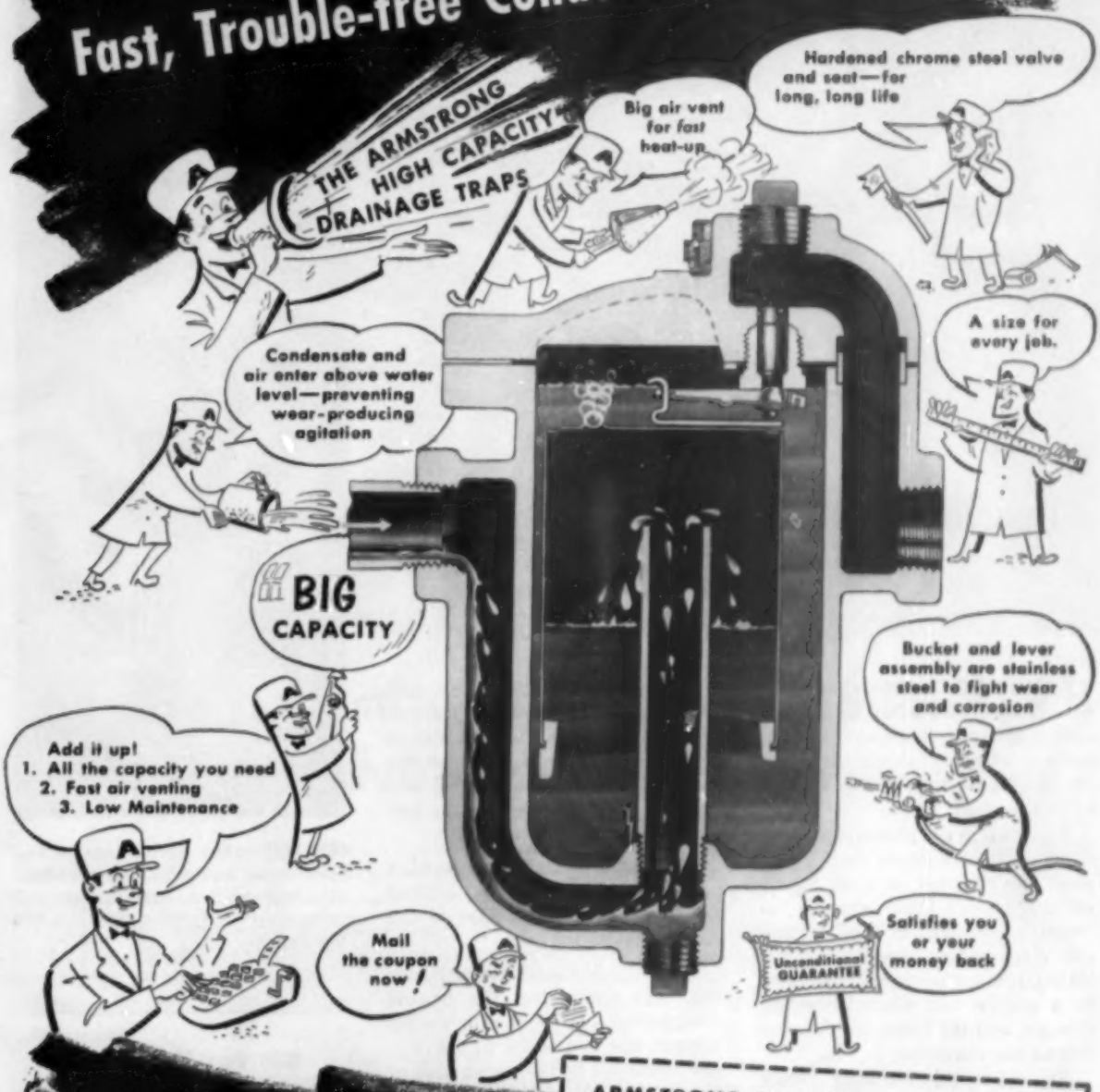
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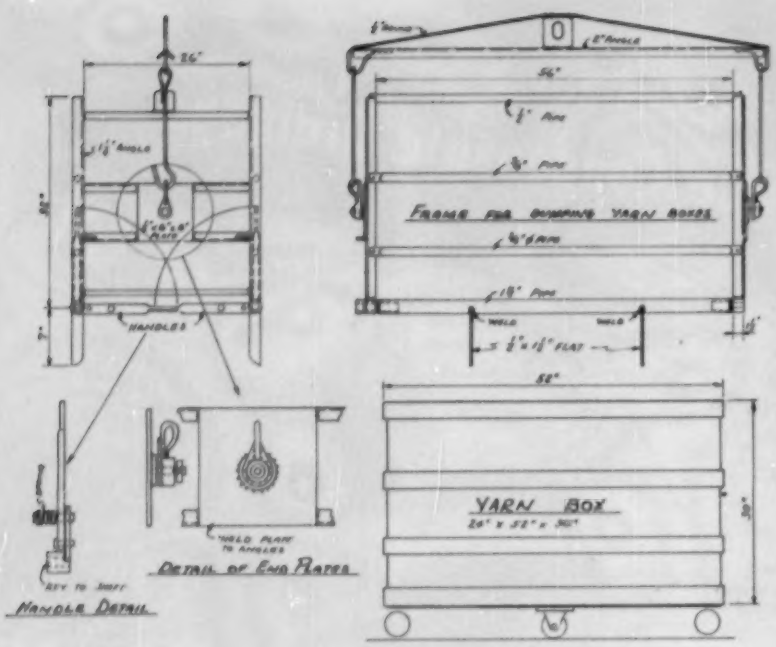

Handling and Dumping Loaded Boxes

By H. C. NORMAN, Master Mechanic

West Boylston Mfg. Company, Montgomery, Alabama

HANDLING bobbin boxes at West Boylston Mfg. Company at Montgomery, Alabama, has been made a lot easier through the use of equipment developed and made up in the plant.

As shown in the photographs, the standard bobbin boxes used in the plant are mounted on small rollers which provide a little clearance between the bottom of the box and the floor. After these boxes are loaded, it is necessary to move them to a central bin where they are dumped, and the boxes are then returned for reloading.

The key to this handling system is a relatively simple bottomless cage which is moved by an electric hoist suspended on a trolley system which passes over several winder hoppers.

Design Features

While construction of the fabricated cage is simple enough, it has three specific elements which are essential to the specific service for which it is designed:

(1) Note the shaft, clamp, and latch arrangement at the bottom of the cage which makes it possible to lower the bottomless cage over the box, and then turn the clamps into position and lock them so the box can be raised with the cage.

(2) Note that the suspension points by which the cage is lifted are located near the center of the end section of the cage.

(3) Note in the photograph how the cage containing the box is transported beside the unloading hopper, and two hooks on the cage are connected to the upper edge of the hopper. Hooked in this position, pulling up on the cage with the hoist causes the cage to rotate and dump the box.

After the box is hoisted into position, and rolled over to empty the bobbins into the hopper, the hooks are disconnected and the empty box is lowered to the floor and released by the catches. The cage is then moved back into position to pick up another loaded box.

PHOTOS — top to bottom — show hoist frame being lowered over box; attached to box; and entire unit being inverted, to empty bobbins into the hopper.

$$$ For Your Ideas

Send your ideas, methods and short-cuts to Southern Power & Industry. Payment is made for suitable material—a photo or rough sketch will make your idea more valuable.

Articles from maintenance and production men in Southern and Southwestern plants are preferred. Material must not have appeared elsewhere nor been sent to another publication.

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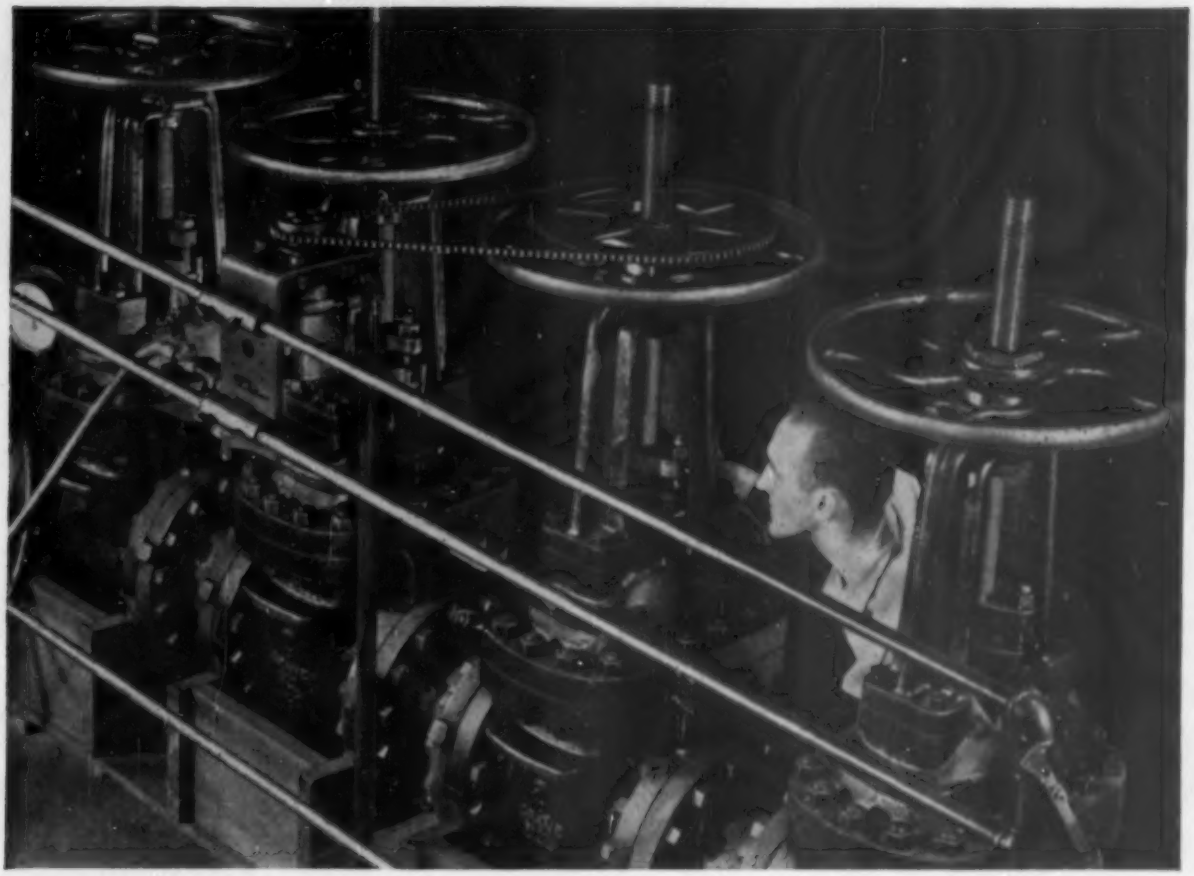

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Here's one of the reasons back of the thrifty buyers' preference for Crane valves. They can rely on ever-improving Crane quality to protect their company's investments in piping equipment—especially today, in the face of high maintenance and repair costs. No wonder industry keeps using more Crane valves than any other make.

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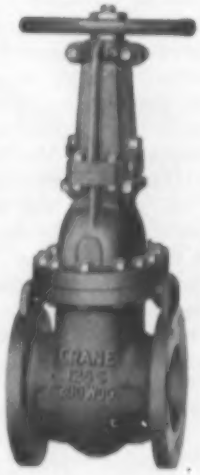

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Guide for the industrial user . .

Seeking Atomic Energy Information?

Non-specialized reference guide covers general, radioactive isotopes, atomic power and business opportunity categories in dependable and inexpensive publications.

By JOHN F. LEE

SP&I Consultant on Atomics and
Professor of Mechanical Engineering
North Carolina State College
Raleigh, North Carolina

HAVE you been examining your company's position in the rapidly expanding field of atomic energy? Do you wish to know how atomic energy may be utilized to improve manufacturing techniques?

Perhaps you are wondering how some of your company activities will be affected by shifting demands for various products brought about by new uses for atomic energy. Or you may be asking how a small business can get in on the $2,400,000,000 spent annually by the Atomic Energy Commission and its prime contractors.

It is possible that you are considering extending your normal activities to include processing of radioactive isotopes for industrial uses or manufacturing some of the many types of instruments or other products associated with peaceful uses of atomic energy. Or it may be that you are interested in only a general knowledge of what is happening in the industrial applications of atomic energy.

If you are not already seeking the answers to these questions it is a safe assumption that you will be in the not-too-distant future, for atomic energy is a mammoth new industry which will eventually affect nearly all industrial activity.

Information Sources

If you are seeking information on atomic energy you are undoubtedly wondering at the same time where this information can be found. Without question the most prolific source of information is the unclassified literature in the field —and furthermore it is the least expensive source. However, finding what you want to know can be an exasperating and time-consuming task without an effective guide through the tons of papers and books devoted to atomic energy in all its phases. Many publications are intended for experts and cannot be read with full understanding by persons who have not had specialized training. Some papers are of interest to a theoretical physicist only and offer very little of value to industry. Nevertheless if the reader is shown where to look he can find a wealth of useful information written so that the non-specialist can understand it.

To meet the need for an effective guide to the literature the following list of dependable and informative publications has been prepared covering the various categories of atomic energy development likely to be of interest to the industrial user. The list is not intended to be exhaustive and the omission of a particular publication is not intended to be a reflection on its value.

General Literature

Glossary of Terms in Nuclear Science and Technology (9 booklets); ASME; $.60—$1.00

Role of Engineering in Nuclear Energy Development (TID-5031); OTS; $1.40

Selected Readings on Atomic Energy; GPO; $.15

Atomic Energy in Industry (2 reports—Special Conference and Second Conference) NICB; $10.00 each

List of Research Reports for Sale; OTS; Free

Availability of AEC Research and Development Reports (TID-4550); OTS; Free

Handbook on Aerosols; GPO; $.70

Handbook on Liquid Metals; GPO; $1.25

Uranium, Plutonium, and Industry; ASME; $1.50

Bibliography of Selected AEC Reports of Interest to Industry (TID-3050); OTS

Business Opportunities in Atomic Energy—Forum Report; AIF; $6.00

Radioactivity in Some Oil Fields of Southeastern Kansas; GPO; $1.00

Source Book on Atomic Energy—Glasstone; DVM; $3.40

Introduction to Nuclear Engineering—Murray; P-H; $9.00

Introduction to Nuclear Engineering—Stephenson; McG-H; $8.00

Radioactive Isotopes

Isotopes—A Five-Year Summary of U. S. Distribution; GPO; $1.00

Radioisotope Applications of Industrial Significance (TID-5078); OTS; $.30

Isotopics (Quarterly); GPO; $.35 each, $1.00 annually

Industrial Uses of Radioactive Fission Products; SRI; $1.50

Special Sources of Information on Isotopes; ID; Free

New Industrial Users of Radioisotopes; ID; Free

Radioisotope Techniques, Vol. II, Industrial and Allied Research Applications (30 papers); BIS; $5.75

Information on Industrial Uses of Radioisotopes; ID; Free

Radioisotopes in Industry—Bradford; REIN; $8.00

How You, Too, Can Use Radioisotopes; ID; Free

Availability Code

ASME—The American Society of Mechanical Engineers, 29 W. 39th St., New York 19, N. Y.

OTS—Office of Technical Services, Dept. of Commerce, Washington 25, D. C.

GPO—Superintendent of Documents, Government Printing Office, Washington 25, D. C.

NICB—National Industrial Conference Board, Inc., 247 Park Avenue, New York 17, N. Y.

AIF—Atomic Industrial Forum, 260 Madison Ave., New York 16, N. Y.

DVN—D. Van Nostrand Co., 240 Fourth Avenue, New York 3, N. Y.

P-H—Prentice-Hall Co., 70 Fifth Ave., New York 11, N. Y.

McG-H—McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N. Y.

SRI—Stanford Research Institute, Stanford, Calif.

ID—Isotopes Division, AEC, Oak Ridge, Tenn.

BIS—British Information Service, 30 Rockefeller Plaza, New York 20, N. Y.

Rein—Reinhold Publishing Company, 330 W. 42nd St., New York 18, N. Y.

AEI—American Exporter Industrial, 386 Fourth Ave., New York 16, N. Y.

RSD—Radioisotope Sales Dept., Oak Ridge National Laboratory, Oak Ridge, Tenn.

ASTM—American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

UC—College of Engineering, University of California, Berkeley, Calif.

APC—American Power Conference, School of Engineering, University of Illinois, Urbana, Ill.

GE—Knolls Atomic Power Laboratory, General Electric Company, Schenectady, N. Y.

NCSC—Department of Engineering Research, North Carolina, State College, Raleigh, N. C.

IDO—Idaho Operations Office, AEC, Idaho Falls, Idaho

Atomic Science Helps Industry; AEI; Free to qualified recipients

Putting Atoms to Work in Industry; "Business Week," Oct. 25, 1952

Current Uses of Radioactive Isotopes in Industry; ID; Free

Use of Nuclear Techniques in Manufacturing Operations; ID; Free

Industrial Uses of Radioactive Isotopes; "Southern Power & Industry," October, 1954

Protection in Use of Radioisotopes; ID; Free

Design of Laboratories for Safe Use of Radioisotopes; OTS; $.35

Some Practical Considerations in Radiation Shielding; ID; Free

Electrostatic Neutralizer Discharge and Safety Characteristics; "Elec Eng'g," April, 1952

Catalog and Price List of Radioactive and Stable Isotopes; RSD; $1.00

List of Available Isotope—Labelled Compounds and Suppliers. "Isotopics," 1950; GPO; $.35

Radioisotope Procurement Procedures; ID; Free

AEC Radioisotope Distribution Regulations; ID; Free

Federal Control of Radioisotopes; ID; Free

Practical Radiography for Industry—Clauser; Rein; $4.75

Use of Radioactive Isotopes in Industrial Radiography; "Non-Destructive Testing," Fall 1950

Tracer Technique for Studying Gear Wear; "Nucleonics," October, 1952

Radioactive Tracers Reveal Friction and Wear of Metals; "Metal Progress," September, 1951

Tracer Methods for Assessing Wear of Wire-Drawing Dies; "Nucleonics," November, 1951

Detection by Radioactive Means of Leaks in Buried Pipes; ID; Free

Application of the Radioactive Tracer Technique to Metal Cleaning; ASTM; Bull. No. 158

Radioactivity in Pipe Line Flow Studies; "World Oil," May, 1949

Radioactive Tracers for Tagging Special Steel Melts; "Nucleonics," January, 1954

Atomic Power

Reports to AEC on Nuclear Power Technology; GPO; $.25

Atomic Power and Private Enterprise; GPO; $1.25

Nuclear Power Associated Heat-Cycle Equipment; UC

Appraisal of Atomic Power; "Southern Power & Industry," March, 1954

Nuclear Power Plants for Ship Propulsion; AIEE

Thermal Design of Nuclear Power Reactors (54-A-58); ASME; $.50

First Central-Station Atomic-Power Plant; "Mech. Eng'g," July, 1954

Working-Stress Criteria for Nuclear Power Plants (54-SA-59); ASME; $.50

Status of Nuclear Power Reactor Technology (53-A-227); ASME; $.50

Progress Toward Industrial Atomic Power (53-A-228); ASME; $.50

Nuclear Power—The Legal Situation (53-A-230); ASME; $.50

Water Problems in the Nuclear Power Field; APC (1954)

Important Factors in Estimating the Economy of Atomic Power Plants; GE

Engineering Development Problems in Atomic Power Plants; GE

Basic Problems in Central-Station Nuclear Power; "Nucleonics," September, 1952

Obtaining Power from Nuclear Reactions; NCSC; Free

Can Nuclear Power Plants Compete?; "Elec. World," August, 1952

Problems of Nuclear Power Plant Operation; IDO

Five-Year Power Reactor Development Program Proposed by AEC; GPO; $.25

Business Opportunities

How to do business with the AEC; GPO; $.15

Business Opportunities in Atomic Energy-Forum Report; AIF; $6.00

$$$ For Your Ideas

Send your ideas, methods and short-cuts to Southern Power & Industry. Payment is made for suitable material—a photo or rough sketch will make your idea more valuable.

Articles from maintenance and production men in Southern and Southwestern plants are preferred. Material must not have appeared elsewhere nor been sent to another publication.

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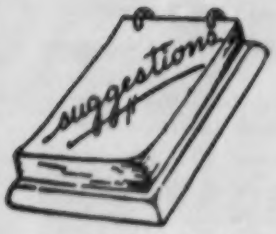


HELPING the *MAN-IN-THE-PLANT*

Ideas . . Methods . . Gadgets

Controlling Dust

A PROBLEM common to many laboratories is the tendency for dust and fume conditions to be present. Such equipment as high speed grinding machines, buffers, and wire brushes will throw up various kinds of powdery materials. Even so-called "wet" operations, like wet pumice polishing, can cause bothersome amounts of dust to disperse into the working areas.

Although in many cases the amount of dust expressed by weight is rather small, much of it is of a very small particle size. Its effect, therefore, is felt virtually all over the laboratory, since the dispersed material travels considerable distances before it settles.

Laboratory operating expense can be out of line because of the need of an excessive amount of house cleaning. Equipment wear and maintenance increase with the presence of dust. Motors are particularly susceptible.

Such was the condition at Woodward Prosthetic Co., Greensboro, North Carolina. This dental laboratory had dust, fume, and odor created at 17 grinding, buffing, and polishing stations. These were on three work benches.

Equipment Installed

Local exhaust ventilation, employing hooding, duct work, and a Dustube cloth-tube-type dust collector, was adopted. Cloth filtration was chosen for the collector unit because of its efficiency—well above 99 per cent, even with dust particles in the low micron ranges.

The hooding for each machine is constructed out of the way of the workman, yet in a position where it can corral all of the dust produced. Three fans (one for each work bench) pass the dust-laden air under pressure through ducts into the dust collector outside the building. The collector, which was designed by American Wheelabrator & Equipment Corp., has scores of 5 in. diameter cloth tubes, providing hundreds of square feet of filtering area. The clean air, having no visible matter in it, is discharged directly to the atmosphere. Periodically, the tubes are mechanically shaken, whereupon the dust collected in them falls down into hoppers. From there it can be removed for disposal. These operations need to be performed only once in several weeks' time.

The dust problem at this laboratory was completely eliminated. Working conditions were made more healthful and more pleasant and cleaning to maintain sanitation is now necessary less frequently.

Holder for Valve Repair Materials

THE illustrated compact holder has proved advantageous for keeping valve repair materials at an individual's work bench. Device has divisions for packing, oil, white lead, paint stick, crayon and grease so that materials are kept in good condition and trips to the tool room are eliminated.

Necessary materials are in a very small area at the employee's finger tips. Packing is kept neatly coiled and clean. Good housekeeping advantages are obvious.

By GEORGE W. MIDDLETON, Valve Mechanic, Reclamation Dept., Baytown Refinery, Humble Oil & Refining Company, Baytown, Texas.

New Valves Save on Welding Gas Costs

IN A LARGE New Orleans shipyard, costly loss of welding gases was traced to the conventional packed valves formerly used on the system. Leakage through the stuffing persisted despite frequent, regular servicing of stem packing on the valves. This high maintenance cost added to the yard's loss.

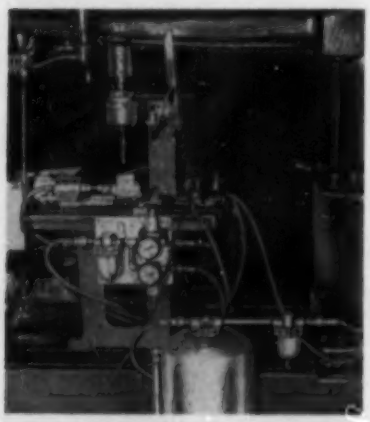
Plant engineers found the remedy in Crane No. 1652 packless diaphragm valves. Feature of the valve is no seating stress on the diaphragm. The new valves stopped the leakage, and not one Crane valve has needed attention since installed more than 2 years ago.

Spray-Lube System

AT THE Standard Tool and Machine Co. in St. Louis, the tapping of 100% threads in the end of a section of thin wall aluminum tubing was a time-consuming, messy operation.

The cutting compound used was a mixture of ½ mineral oil, lard and turpentine and ½ industrial wax. It was applied to the tap by hand with a brush.

Since the new Norgren (C. A. Norgren Co.) Spray-Lube System was installed, the operation is much more efficient.



LUBRICATION is now automatic—better tapping quality, cleaner procedure and machine output increased 35%.

Yes, Dart Unions fit tighter and last longer because their two bronze seats are precision ground to a true ball joint. You get a drop-tight connection without straining arm, wrench or union. What's more, a Dart uncouples just as easily. Ask your supplier.

QUICK FACTS

- Extra wide bronze seats resist pitting and corrosion.
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Vapor Purger

By L. W. HOUCK

THIS shop-assembled blower is used by Dowell, Incorporated, Tulsa, Oklahoma, to clear out fumes from tanks being cleaned and repaired. The commercial flexible duct serves excellently to carry air into the tank—thus providing necessary purging and ventilating while workmen clean, paint and weld inside.

Modified Air Conditioning Units Answer to Lint Problem in Georgia Clothing Factory

THE tremendous quantities of lint present in clothing manufacture have always created a problem in air conditioning clothing factories. Tiny lint particles released in cutting and sewing operations clog ordinary filters in a day, greatly reducing the efficiency of the units.

One clothing firm, the L&H Shirt Company of Cochran, Georgia, has licked this tricky problem with units specially equipped to handle lint.

Units Modified—Air Conditioning dealer Aaron Torch installed eighteen General Electric packaged units throughout the L&H plant. From each of the units located in heavy lint areas he removed the standard filter and reinstalled it in a sheet metal frame flush on the front of the unit. Because lint does not penetrate the filter, but collects as a film on the front, it is possible for the cleanup man to vacuum the face of the filters during his nightly rounds. It is necessary to vacuum clean the manufacturing area floor and work surfaces each night and the filters add only a few minutes to the cleanup man's work.

The L&H Shirt Company employs more than 600 people and turns out thousands of Lucky Boy and Big Boy shirts for boys per day. The factory occupies 32,500 sq ft and its eighteen G-E packaged units range in size from 3 to 15 tons. The air conditioning totals 203 tons in all. The entire factory uses four forced draft cooling towers for four zones of control.

Another problem overcome on the L&H job was created by the huge working areas and great heat loads of the sewing rooms. These rooms total 16,000 sq ft and are crowded with people and sewing machine load concentrations. They also have large areas with long air throw. To pick up these heavy loads and shorten the throw, units were placed in the middle of the sewing area and arranged for four way distribution by installing a double deflecting grill in the back of the plenum.

Cut Gaskets Right

WHEN cutting gaskets for flanged pipe connections or horizontally split pump casings, be sure to cut the gaskets with as square an edge as possible. Never beat gaskets out by using a ball-peen hammer to cut gasket edges and bolt holes.

When cutting gaskets for steam lines, use a gasket cutter and hole punches. A square edge gasket cut to proper size will protect the full face of the flanges and prevent erosion of flange material. Gasket cutters and hole punches are relatively inexpensive when compared to the cost of new flanges.

When cutting gaskets to fit pump casings, especially boiler feed and chemical pumps, trace the casting outline on the gasket material and cut out carefully with a sharp knife. To do so will save trouble, gaskets and dollars.

By A. T. LOHKAMP, Plant Engineer, Pasco Packing Co., Dade City, Florida

EROSION of pump casing following contour of gasket.

Band Saw for Tube Bundle Disassembly

THIS shop photo of a band saw illustrates a practical method of cutting off tubes from behind a tube sheet for reuse. Our old method consisted of using a hack saw, skill saw, cold chisel, or burning torch, which proved rather expensive. By turning the tube bundle, we are able to saw through a diameter of 35″ and a 27″ diameter without moving the bundles.

SHOP band saw cutting tube sheet from large tube bundle.

In one instance we were able to saw through a bundle containing one hundred and twenty (120) ⅝″ O.D. copper tubes in 37 minutes, effecting a saving in labor of 75%. We also use this saw in cutting tubes in new fabrications of both the straight and U tube variety and large numbers are cut at a time by means of a specially constructed jig.

So far, we have been able to saw through all metals with the exception of Hastelloy. In many cases, we use this saw in making baffles for tube bundles, thus eliminating much machine work. It has many other usages such as sawing plates, angles, etc.

By W. E. ACKERMAN, General Contract Supervisor, Maintenance Department, Carbide and Carbon Chemicals Company, Texas City, Texas

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Small Boiler Efficiency

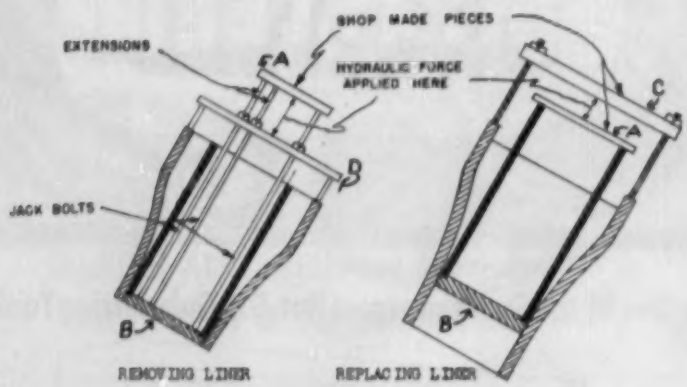
YES, small power plant boilers can be operated efficiently. Too many of the present-day owners of power boilers are inclined to believe that such boilers cannot be operated at high efficiency and that only "large" power plant boilers can be efficient. They think that small boilers are naturally wasteful of fuel and comparatively expensive to operate per horsepower and that "nothing can be done about it." They think that the boiler itself is not at fault, nor the fireman, nor anybody else. They believe that the fault is simply due to the fact that the boiler is small.

Such thinking, though, is wrong. Small boilers can be operated efficiently. Inefficient performance is usually due to blind operation owing to the fact that no visible guides are provided for the fireman. Give the fireman the proper recording devices and operating indicators and if he is at all conscientious he will quickly step up the efficiency of the boiler and make the recorders and indicators pay for themselves, and earn worthwhile dividends in addition.

There are recorders on the market that show steam flow, air flow, the flue gas temperature at a glance. It is not necessary for the fireman to do any guessing with such records before him. He will soon know by observing the records whether the baffles leak, whether the tubes are dirty, whether the setting leaks, whether too much air is used, etc.

Give your small boiler the same consideration that you would give to a large boiler and you will find that the small boiler, too, can be operated at high efficiency. The money expended for the improvements and recording and indicating devices will soon be returned in the form of large savings.

By S. F. WORLEY



PART A—Shopmade triangular piece of tank iron 1" thick with three 1⅛" holes 11" apart, with 8" stud bolts or extensions in each hole. This part is used to pull old liner out and to press new liner in.

PART B—Commercially available circular piece of equipment with a shopmade eye for a chain hoist hook. This eye makes it possible to put this part into place at the bottom of the liner and to handle both the old and new liner with the chain hoist.

PART C—Shopmade equipment used to press the new liner in. Consists of a piece of 2½" extra heavy pipe 25" long, with two 1⅛" holes 10⅜" from center, and two 1" stud bolts 10" long with SAE thread adapters on one end. This is used to press liner in its place.

PART D—Four-legged, table type, commercially available equipment that is used with Part A in removing old liner.

Changing Compressor Power Cylinder Liners

By OWEN H. EDWARDS, Repairman, Katy Gas Cycling Plant, Humble Oil & Refining Company, Katy, Texas.

BY USING two shop-made devices in conjunction with commercially available tools for removing and installing power cylinder liners on our compressors, it was found that the two operations could be accomplished with hydraulic force rather than mechanical with screw nuts and jack bolts.

Because the old method of changing liners was so time consuming, the practice of changing the complete cylinder was adopted. Since the liners can now be changed with hydraulic force in much less time, the need for changing the complete cylinder has been eliminated, which results in saving considerable labor and compressor down time.

How Device Works

After power head and piston have been removed from cylinder, run chain hoist hook down through inside of cylinder and hook it into the eye of **Part B**, that has been placed in the crankcase. Pull **Part B** into position at bottom of liner with the chain hoist. Screw the three jack bolts into **Part B** and put **Part D** into position on the top of the cylinder. Screw **Part A** extensions on jack bolts and adjust nuts on **Part A's** extension tight with an hydraulic jack placed between **Parts A and D**. Raise the jack lift about 6 or 8" or until the liner becomes loose in the jacket. Pull chain hoist tight and remove **Parts A, D** and jack bolts.

Lift liner from jacket with chain hoist. Set new liner down inside of jacket as far as it will go with chain hoist and **Part B** (with this set-up the liner hangs at the same angle as the jacket). Put **Part C** into place by screwing the S. A. E. adaptors on two head bolts that are directly across the center from each other, and place **Part A** (with extensions out) as a flat plate on top of the liner. Place hydraulic jack between **Parts A and C** and tighten. Then as jack lift is raised the new liner is forced down into its proper position.

Floor Mats from Discarded Hose

SATISFACTORY floor mats have been made by fastening together lengths of discarded ½" or ¾" air or water hose with 3/16" bolts and #12 wire. They can be fabricated in any desired size for placement in front of work benches, machine tools, etc.

Since discarded hose is used, economies over sponge rubber mats are evident. Greater service life is expected since the hose mats are stronger and more abrasive resistant.

By ROY D. KILOUGH, Toolroom Operator, Tool & Equipment Dept., Baytown Refinery, Humble Oil & Refining Company, Baytown, Texas.

Dual Fuel Firing

IN Macon, Georgia, the Central of Georgia Railway Company shops employ dual fuel firing to effect annual savings of more than $16,000 in operational costs and to assure a steady fuel supply.

Iron Fireman Pneumatic Spreader stokers were installed in 1946. The four units, each burning from 2,900 to 3,500 pounds of coal per hour, were later supplemented by four Iron Fireman RG-125 industrial gas burners installed in 1951. Each burner has an input rating of from 2,700,000 to 18,750,000 Btu.

With straight coal firing, annual fuel costs figured to about $40,850. With the combination of gas firing and coal stand-by, fuel costs dropped by about $11,900 a year to an annual figure of $28,950.

Beyond this $11,900-a-year saving in actual fuel expense, the railroad had labor savings of approximately $5,000 a year. In addition, said J. H. Grayson, Macon shop engineer, constant steam pressure was maintained 24 hours a day, while the fact that no equipment blocked the front of the boiler made it easily possible, if necessary, to hand-fire extra fuel.

Stokers and gas burners are automatically controlled.

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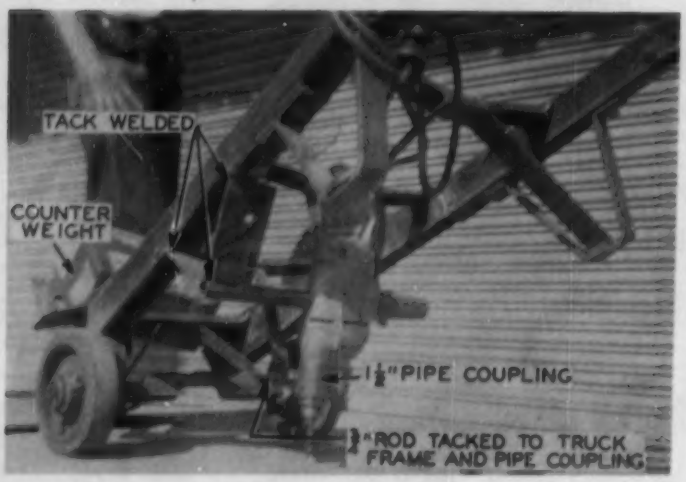


"Shop Designed" Portable Drill Press

THIS portable drill press was recently used with success in our plant maintenance operations. We attached a ½" electric drill to a common hand truck.

We used this equipment to drill over 2,000 ft of 1½" x 1½" x ¼" angle, in 21 ft lengths. Since the work could be laid on the floor, one man was able to handle the entire job.

By CLAUDE BRIDGES, Cherokee Finishing Company, Gaffney, S. C.

Testing Employee Vision

BETTER utilization of man power can result from testing employee vision on an Ortho-Rater. At the Continental Can Company plant in Tampa, Florida, it was found that there is a definite connection between vision and first aid visits and also with absenteeism.

Some visual deficient workers make up to ten times as many first aid visits as those who show good eyesight when tested on the Ortho-Rater. As might be expected, a high percentage of employees with absentee records were low on their Ortho-Rater tests when compared to the vision of employees with perfect attendance records.

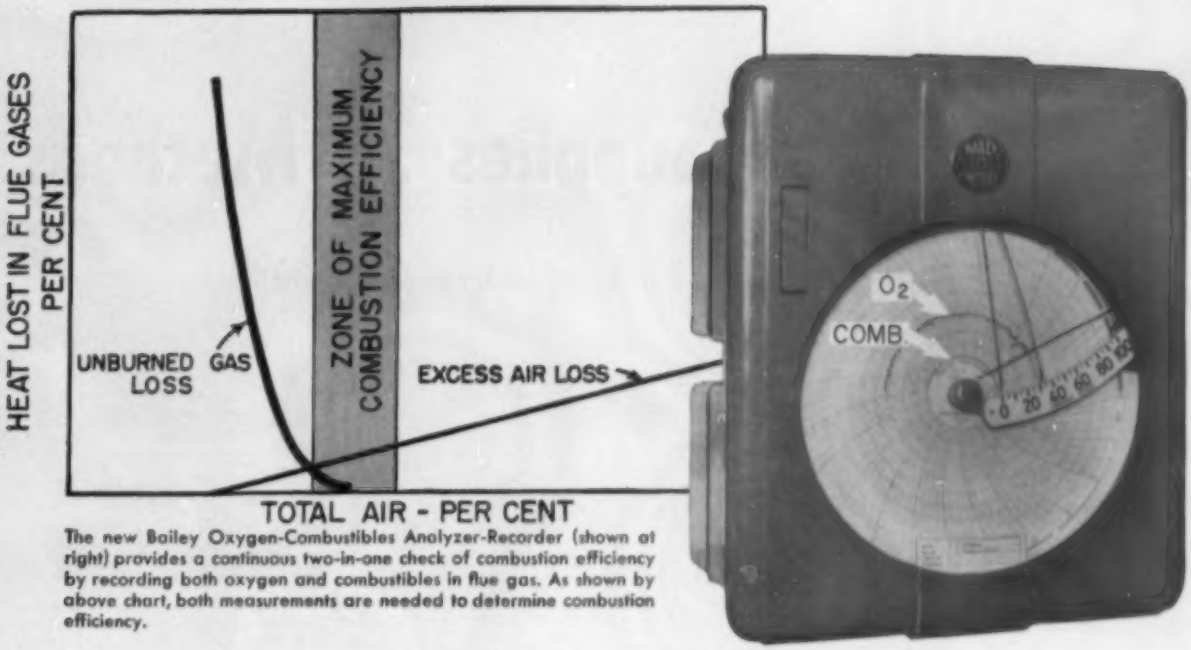
Matching the employee vision to the visual demands of the job on the basis of Ortho-Rater tests and job vision standards has helped improve man power utilization at Continental Can Company. The Ortho-Rater may be purchased from Bausch & Lomb Optical Co., Southeastern Division, Atlanta, Georgia. Price $475.00.

Cotton Carrier Doubles as Trash Collector

HAVING learned that straddle carriers are an efficient and economical method of transporting cotton bales, Gulf Compress, Corpus Christi, Texas, looked around for other ways of utilizing its Ross carriers. One unusual application—that of a mobile trash collector—is pictured above.

Special large-capacity trash containers — made at low cost from scrap materials — are trundled around the 26-acre grounds by the multipurpose carriers, collecting rubbish for burning. Keeping the grounds free of weeds, grass, trash and other rubbish has greatly reduced a potential fire threat.

In normal use the carriers transport 15 cotton bales at once over a highway to a loading dock 2½ miles from the plant. Round trip time, including loading and unloading, is 15 minutes. Previous methods using a tractor-train required more than 90 minutes for the same job.



The new Bailey Oxygen-Combustibles Analyzer-Recorder (shown at right) provides a continuous two-in-one check of combustion efficiency by recording both oxygen and combustibles in flue gas. As shown by above chart, both measurements are needed to determine combustion efficiency.

BAILEY announces . . . New 2 in 1 way to measure Combustion Efficiency

The new Bailey Oxygen-Combustibles Analyzer-Recorder gives you a continuing double check on combustion economy. It's fast response measures and records:

1. Excess air—regardless of the fuel or combinations of fuels being burned.

2. The mixing efficiency of your fuel-burning equipment—by indicating the amount of combustibles in your flue gas, resulting from incomplete mixing of fuel and air.

Combustion efficiency depends upon fuel-air ratio. Too much fuel can be even more costly than too much air. And because of the interdependence of these two factors, no control that measures only one of them can give you complete protection.

Now, for the first time, you can check *both* with a *single* fast acting instrument, using the new Bailey Oxygen-Combustibles Analyzer-Recorder for industrial furnaces, kilns, heaters and boilers.

Fuel economy improves as excess air is reduced—until unburned fuel begins to show up in the flue gas. When this happens, combustion efficiency drops off sharply if there are further decreases in the air-fuel ratio. That's why combustion gases must be analyzed for *both* oxygen and combustibles to get a true indication of efficiency—and that is why Bailey coordinates both measurements on the same chart, to show when excess air may be reduced safely without danger of greater losses from unburned gases.

The Bailey Oxygen-Combustibles Analyzer is an approved combustion safeguard.

Ask your local Bailey engineer for suggestions on application. Equipment details in Product Specifications E65-1 and E12-5. P31-1

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INSTRUMENTS AND CONTROLS

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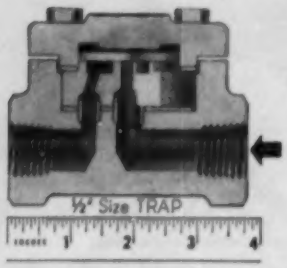
FOR FREE INFORMATION—Circle code number on pages 16 and 17

Thermodynamic Steam Trap

A-1 SARCO COMPANY, INC., Empire State Bldg., New York 1, N. Y., is now in full production on its new Thermodynamic Steam Trap featuring maintenance-free design.

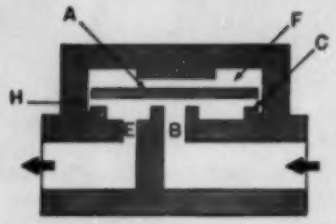
It is not an impulse trap. The kinetic energy of the steam closes the valve.

This operating principle permitted a very simple design which is free of the usual valve closing devices—floats, buckets, bellows, bimetal strips, valves with channels through the center, etc. A solid stainless steel disc—the valve head—is the only moving part. The same head and seat are used for pressures to 600 psi, temperatures to 950 F.



Sarco Company's new trap features maintenance-free design. A solid stainless steel disc is the only moving part.

Manufacturer reports that field installations have all been very successful and vary from high pressure superheated steam mains, unit heaters, tracer lines to low pressure radiators.



HOW IT WORKS—Disc A forms a valve which seats on inlet tube B and also on the outer rim C. It is free to rise and fall in chamber F. When seated, disc A closes steam inlet tube B and also seals the chamber F from the discharge.

Pressure in the inlet tube B raises disc allowing air and/or condensate to flow radially across the underside of disc A to the outlet tube E.

When steam follows, velocity across the disc is much greater and, as steam strikes the body at H, pressure is built up in chamber F.

Pressure on the large area of the disc A, causes it to seat, closing the inlet tube B and sealing steam in chamber F. As pressure in chamber F decreases by condensation, pressure on the inlet tube B again raises the disc A and the cycle is repeated.

Operating characteristics are as follows: closes tight on no load, and operates against a back pressure up to 50% of its inlet pressure. Discharges condensate at saturated steam temperature as rapidly as it forms. This trap can vent large volumes of both air and air-steam mixtures. The starting load capacity is very high, but it operates equally well with light loads or no load. The trap is designed to work just as efficiently at 1 psi as at 600 psi; it is not affected by pressure variations.

The design and metals used enable this new steam trap to withstand superheat, water-hammer, vibration and corrosive condensate.

The Thermodynamic trap is extremely compact: the 1 in. size is only 3⅛ in. x 4¾ x 4 in. high. Bodies of cast semi-steel, carbon or moly steel with screwed, socket weld or flanged connections.

Micro-Chuck equipped with 3-jaw chuck attachment is mounted on a lathe, with Vee Plate, Ell Plate, and Tee Slot attachments at one side.

Work Holding Tool Cuts Shop Set-Up Time

A-2 MICRO-CHUCK DIVISION, SCOTT-BROWNE CORP., Dept. 128, Newton, Ohio, has introduced an all-purpose, universal work holding tool known as the Micro-Chuck.

The basic tool attaches directly to the spindle of a lathe. The face of the Micro-Chuck contains a boss on a slide, to which various work holding attachments can be securely locked. The work, such as castings or stock to be turned, drilled, or faced, is then easily clamped onto the attachment. As the attachment can be adjusted through 360 deg. on the boss, and the boss in turn can be moved up or down the face of the Micro-Chuck on the slide, any point of the work can thus be brought quickly to exact spindle center. After the work is set in position, the unit is securely locked into place, so that the work is held rigidly and can be repeated at will.

What it Takes to Pipe the Atom

No power piping or chemical process piping job is too large or complex for The M. W. Kellogg Company. At the AEC's billion-dollar gaseous diffusion plant, Paducah, Kentucky, it entails the installation of 3,450,000 feet of tubing and pipe for the main process, auxiliary, and instrument piping, and represents 17,500,000 total man-hours—850,000 engineering, 2,600,000 welding. M. W. Kellogg also will test the system prior to use.

M. W. Kellogg's responsibility started long before a single length of pipe could be put in place. It included an on-the-site welding school—to help all contractors master unfamiliar techniques, and a temporary pipe fabricating and fitting shop costing one million dollars. Once work was started, the control system to prevent product contamination was so strict that not even a thumbprint was allowed on the interior of the pipe.

The size and complexity of the Paducah assignment ... the outstanding labor relations and safety records achieved ... help explain why The M. W. Kellogg Company is pre-eminent in the engineering and construction of jobs ranging from public utility piping systems to complete refineries and chemical processing plants.

M.W. Kellogg

ENGINEERING FOR TOMORROW

THE M. W. KELLOGG COMPANY, NEW YORK 7, N. Y.

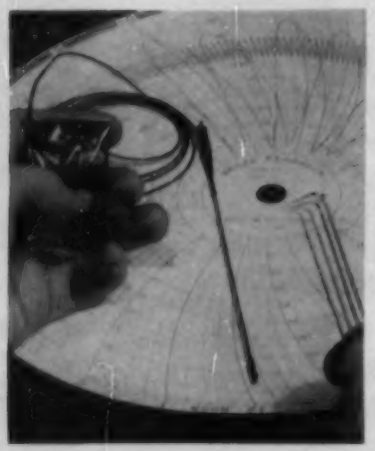
The Canadian Kellogg Company, Limited, Toronto • Kellogg International Corporation, London.

SUBSIDIARIES OF PULLMAN INCORPORATED

Equipment . . Supplies . . Methods (Continued)

One-Year Automatic Inking In Recording Pen Design

A-5 BAILEY METER COMPANY, 1050 Ivanhoe Rd., Cleveland 10, Ohio, has designed a new instrument recording pen claimed to save operating dollars daily by speeding data interpretation and relieving skilled personnel of monotonous duties.



This featherweight, stainless steel capillary pen is fed from a clear, hermetically-sealed, plastic ink sac containing over a year's supply. Capillary action maintains continuous flow to a precision ground point which traces a sharp, opaque, quick-drying record.

"Poisoning" of intersecting records is practically eliminated, thus perfecting chart legibility. As many as four pens trace on parallel time arcs only forty-two thousandths of an inch apart, which simplifies record interpretation and analysis.

The sealed inking system prevents sludge and oxide formation. It is contamination proof, non-corrosive, non-evaporating, and delivers an uninterrupted flow of fresh ink in brilliant color. Pens have run on equivalent 15-year accelerated tests at ambient temperatures from 20F to 140F without breakdown or appreciable wear.

The one-year, automatic inking will save many man-hours per day in plants where hundreds of tank-type recording pens require day-to-day refilling by operators or skilled technicians.

This inking system is designed for exclusive use in the new Bailey Recorder.

Steam Trap Line For All Load Conditions

A-6 STRONG, CARLISLE AND HAMMOND, 1392 West 3rd St., Cleveland 13, Ohio, is marketing "Hydro-Flex" Steam Traps designed to provide high operating efficiency under all condensate load conditions.

The new line is available in semi-steel, cast steel and forged steel construction for use on any and all pressures up to 2500 psi and temperatures to 1100 F.

The manufacturer reports that surveys made in plants indicated that under normal operating conditions many steam traps actually operate at less than 1% of their rated capacity. This fact was a prime objective in the development of the Strong Hydro-Flex traps. The goal was to build a trap of reasonably high capacity, but particularly one that would function efficiently even on extremely low condensate loads.

Another objective was low maintenance cost. To accomplish this, all of the internal working parts are of heavy stainless steel to withstand severe operating conditions. The bucket is of stainless steel, deep drawn with no seams or joints. There are no removable pins.

Dual fulcrum arrangement and powerful lever-lift action assure performance under all condensate loads. Low maintenance cost and high discharge capacity are other features of the Strong "Hydro-Flex" steam trap.

An outstanding feature of this new trap design is the dual fulcrum which powers the valve lever. This includes a primary high leverage fulcrum for cracking the valve from its seat and a secondary low leverage fulcrum to open the valve wide and give maximum unrestricted flow.

This highly efficient discharge arrangement makes possible high discharge flow rates when required, yet permits efficient handling of very low condensate loads.

Gasket Design

A-7 CRANE PACKING COMPANY, 1800 Cuyler Ave., Chicago 13, Ill., announces a new development in gasket construction claimed to eliminate flow restriction and turbulence in the line, as well as danger of gasket rupture at high temperature due to entrapped air between insert and envelope.

"JOHN CRANE" FreeFlow Construction

Gasket flush with pipe I.D.—allows completely unrestricted flow.
No air pocket—insert flush with I.D. of envelope. No danger of rupture due to expansion of entrapped air at high temperatures.

Ordinary "Wishbone" Construction

Envelope extends beyond I. D. of pipe, causing flow restriction and turbulence.
Expansion of entrapped air at high temperatures presents danger of gasket rupture.

The inner periphery of the "Free-Flow" gasket is of "channel" construction so designed that it does not extend beyond the I.D. of the pipe to cause a throttling action. This construction also assures full contact with the pipe flanges. In addition, design allows the insert to extend to the full depth of the gasket envelope thereby eliminating an air space. Neither of these features are possible in gaskets of ordinary "wishbone" construction.

The envelope is made of chemically inert DuPont Teflon. This adapts the gasket to practically all known corrosive services, plus widely varied temperature conditions from —100 to +482 F, depending upon insert material.

new equipment (continued)

Available in all shapes and sizes for a wide variety of applications, "FreeFlow" gaskets are especially recommended for service in glass lined, porcelain and pyrex equipment, including reactor kettles and pipes, distillation columns and nozzles.

All-Purpose Paint Pot

A-8 AMERICAN PRODUCTS Co., 1308 Edson Ave., New York 69, N. Y., has introduced an all-purpose paint pot which hooks on to rung or step ladders, and is designed to be a safe container for use on scaffolds or staging, where it is hung on the side rails.

Arsco's "Rol-A-Pot" facilitates heavy-duty painting; adjustable ramp acts as "dip-gauge."

Handles facilitate carrying with one hand, and one-piece rustproof metal construction assures sturdiness and long life.

The "Rol-A-Pot" is easy to shift while on ladder or scaffold. It slides easily on floor without danger of tipping. The adjustable ramp acts as a "dip-gauge" for putting the right amount of paint on the roller.

The container is of streamlined rectangular shape and will hold 1 gallon or more of paint, depending on size of container. Models are available for rollers up to 9", 14", and 18".

Underfloor Elec. Raceway

A-9 NATIONAL ELECTRIC PRODUCTS CORPORATION, Gateway Center, Pittsburgh, Pa., is marketing a new industrial type of Nepcoduct underfloor electrical raceway, with more than three times the capacity of standard underfloor duct.

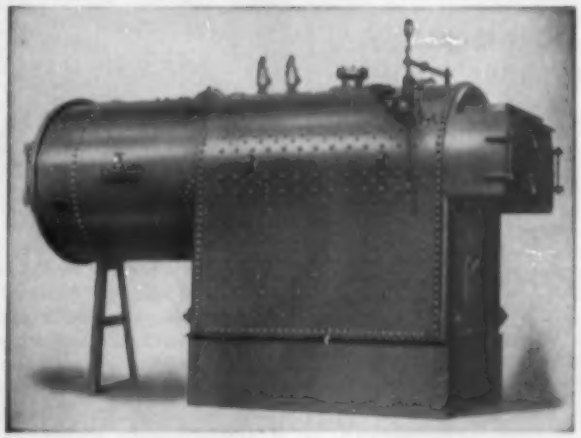
A rugged, 14-gauge cold rolled steel raceway with a 4" x 4" cross section, Industrial Nepcoduct is designed for heavy-duty wiring in industrial plants where overhead wiring would interfere with normal operations.

The new Nepcoduct's greater capacity allows a flexibility in plant layout which is not possible with the lesser capacity of standard underfloor raceways. Electrical installations which utilize such an extensive distribution system permit an almost infinite variety of machinery emplacements, since all areas are adequately served by electrical outlets.

The new product is furnished in standard 10 ft lengths and provides 2" pipe size, threaded outlets on 24" centers permitting the direct insertion of conduit for standpipe service fittings. Complete with junction boxes and a full complement of fittings, Industrial Nepcoduct is a fully grounded, industrial underfloor wiring system.

For more data circle item code number on the postage free post card — p. 17

POWER
with POWER *to spare*



A NEW DOUBLE PASS ALL-PURPOSE INDUSTRIAL AND HEATING BOILER

SOUTHERN MADE FOR SOUTHERN TRADE

Made in sizes from 44 H.P. to 153 H.P. S.B.I. rating with pressure to 150 lbs. Designed for coal, gas or oil firing, the New Lucey Double Pass Boiler can be furnished complete as a package unit.

This boiler is in addition to our regular line of single pass fire box boilers which we have been making since 1918.

WRITE FOR BULLETIN NO. 153 FOR COMPLETE SPECIFICATIONS

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Want the quick, low cost answer to almost any heating problem in your plant? Get it with Chromalox Electric Heaters! Over 15,000 types and sizes for heating dies, molds, platens; for preheating oil and superheating steam; for heating asphalt, greases, oils; for drying, curing, baking, dehydrating and other heating jobs. See how Chromalox Electric Heat can help cut your costs!

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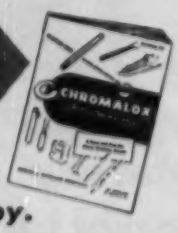

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A-4421

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CHROMALOX
THE BEST IN ELECTRIC HEAT

C. B. Bowes and Associates, 1860 Peachtree St., N.E., Atlanta 5, Ga.; L. H. Ward Co., 2402-11 Oaklawn St., Dallas 26, Texas; 1814 Texas Avenue, Houston 3, Texas; Hanson, Wallace & Co., 1101½ East Fourth Street, Charlotte 2, N. C.

Equipment . . Supplies . . Methods (Continued)

Snap-On Drum Heaters

A-10 PRE-FAB HEATER CO., Guilford, Conn., announces that wax, grease, oil and other viscous liquids can be quickly melted or thinned with new woven electric heaters which are readily wrapped around and snap-fastened to 55-gallon shipping drums.

Extremely light in weight and fast-acting, the snap-on heaters provide uniform heat by snug contact with the drum surface. Standard construction of the drum heater consists of alloy resistance wire, insulated with tough fibrous glass. With this type of insulation the heaters can withstand 450 F sheath temperatures continuously. For heating acid or alkali compounds, Teflon-insulated elements are available to avoid damage from spillovers.

The new drum heater sections are wired together in pairs to fit between the rings (or chimes). They are available in three standard ratings—1500 or 3000 watts on 115 volts, or 3000 watts on 230 volts. Special heaters can be fabricated to order.

V-Belt Fasteners

A-11 FLEXIBLE STEEL LACING CO., 4607 Lexington St., Chicago 4, Ill., has announced recent improvements in its Alligator V-Belt Fasteners including the substitution of a nylon bushing for the steel bushing.

This not only reduces the weight of the fastener but helps to absorb shocks and adds the wear-resistant qualities of nylon to the fasteners.

Alligator open-end V-belting fasteners and tools are available for A, B, C and D drives. With the fasteners V-belts can be made up in any length to fit any drive quickly and economically. Manufacturer emphasizes that the Alligator fastened V-Belts have just one strong joint. Stretch and follow-up maintenance are reduced to a minimum.

The company offers introductory V-Belt drive units which contain everything needed in one compact package to make up V-Belts quickly.

PVC Valves and Fittings

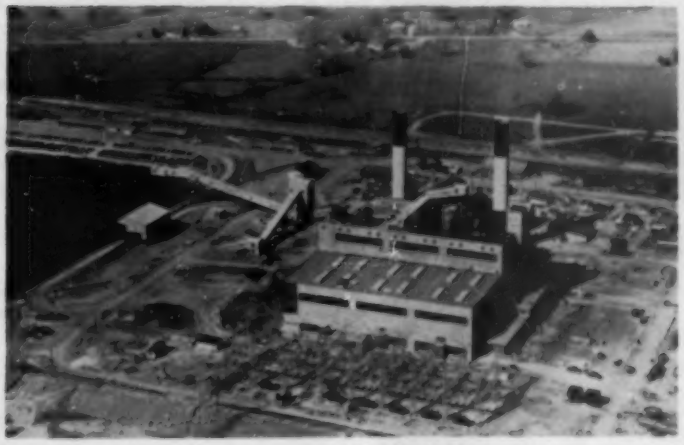
A-12 THE LUNKENHEIMER COMPANY, Beekman St. and Waverly Ave., Cincinnati, Ohio, announces all molded PVC valves and fittings. patented and registered under the name "Luncor."

An exclusive molding process gives the PVC material exceptional strength, protects its natural corrosion-resistance, and substantially reduces manufacturing costs. The price is lower than stainless steel and other alloy valves.

Base material used for the new valve is polyvinyl chloride (PVC), which is now available in the form of corrosion-resistant piping. It is molded in rigid form, suitable for pressures up to 125 pounds and 150 degrees temperature. The valve is presently available in a Y-type globe design.

Lunkenheimer's completely molded "Luncor" polyvinyl chloride valve. Full line of plastic fittings is also available.

(Starts on page 10)



Georgia Power Company's Plant Hammond; Three 100,000 kw Units by Summer of '55

The first turbine generating unit at Plant Hammond near Rome, Georgia, was completed for operation in June, 1954, and the second of its three 100,000 kw units in September, 1954. After the scheduled completion of the third unit in the summer of 1955, the plant will be one of the largest private utility installations in the South.

More than 100,000 ft of pipe are used on instruments alone that control the steam supply for the 300,000 kw plant. Entire power piping system, fabricated and installed by Blaw-Knox Company, consists of 250,000 ft of pipe, ranging in size from ¼" to 24". Sizes of 2½" and larger were shop-fabricated at Pittsburgh and shipped to the site. Smaller sizes were field fabricated at the site.

Research-Cottrell, Inc. Formed by Research Corp.

Engineering, manufacturing and sales of electrical precipitators, until recently divisional activities of RESEARCH CORPORATION, a non-profit foundation, have been taken over by a new wholly-owned subsidiary, RESEARCH-COTTRELL, INC.

Separation of the precipitation business from the corporation's grants and related functions will provide clear-cut distinctions. Earnings of the precipitation activities will continue to provide funds for the foundation's grants to colleges, universities and scientific institutions for research in the physical sciences, including engineering and mathematics.

Cottrell precipitation equipment is used for cleaning gases in power plants, paper mills, non-ferrous smelters, and the aluminum, chemical, steel and oil refining industries.

Headquarters of Research-Cottrell, Inc., will be located in its $2,000,000 manufacturing plant at Bound Brook, N. J. Research Corporation's headquarters will continue to be in the Chrysler Building, New York.

Perry Represents Bitucote

M. H. PERRY has been appointed Southeastern sales representative for BITUCOTE PRODUCTS COMPANY of ST. LOUIS, manufacturers of insulation asphalt products including mastics, emulsions, and protective coatings.

Mr. Perry, whose headquarters are at 2021 Sixth Ave. No., BIRMINGHAM 3, ALABAMA, is also representative in that area for the TALLMAN-MCCLUSKEY FABRICS Co. of St. Louis in the sale of asbestos textiles, and the ROCK WOOL MFG. CO. of Birmingham for their rock wool cements. He was previously Southeast regional sales manager for the Union Asbestos & Rubber Co. of Chicago.

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FINGERTIPS

● The advantages of Reflex Liquid Level Gages. The right type and size gage with suitable valves for pressure, temperature, visibility range and valve centers. Multiple section gages. Drop Forged bodies. Pyrex glass. Basic and special designs.

● When to use Transparent Liquid Level Gage Sets. High pressure steam service. Adapters, valves, connections. Types available.

● Tubular Liquid Level Gages and a selection of Gage valves. Specifications. "Floating Shank." Connections and special features.

● Metallurgical specifications.

Penberthy's Catalog 35, with illustrated facts and specifications, is your best guide to selecting the right liquid level gage sets at the most economical cost. In the complete Penberthy line, there are standard products for almost every application. Where your needs are special or unique, use our experience of almost 70 years to solve them. Many thousands of satisfied users. Write for your copy of Catalog 35.

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URQUHART STATION

South Carolina Generating Co.
subsidiary of the South
Carolina Electric & Gas Co.

30 YEARS OF CONTINUOUS ENGINEERING SERVICE TO A CLIENT

ENGINEERING DESIGN BY GILBERT ASSOCIATES, INC.

GAI engineers have assisted the South Carolina Electric & Gas Co. and its predecessor organizations in meeting the every-increasing demand for electrical energy in its territory. Frequent additions to its system facilities have been successfully accomplished and continuing engineering and consulting services on operating problems as well as plant development, the most recent being Urquhart Station, is evidence of client satisfaction.

URQUHART STATION . . .

Maximum rated capacity of Units #1 and #2 is 75 MW each; Unit #3, now under construction, will be 100 MW.

Units #1 and #2 operate at 1450 psig, Unit #3 at 1800 psig with initial steam temperatures of 1000°F and reheat to 1000°F.

The steam generators are fired with pulverized coal and are rated 510,000 lbs. per hour each for Units #1 and #2 and 700,000 lbs. per hour for Unit #3.

This station will produce sufficient energy in one hour, approximately 250 MWH, to provide the electrical requirements of the average home for 110 years.

Initial operation indicates the ability of the station to exceed the rated design capabilities and efficiencies.

GAI FOUNDED 1929

GILBERT ASSOCIATES, INC.
ENGINEERS • CONSULTANTS
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FOR FREE BROCHURE WRITE DEPT. SG

Many Advantages With Self-Service Parts Bins

THE American serve-yourself supermarket idea is now cutting costs for Lockheed Aircraft Corporation's Georgia Division plant at Marietta, Georgia. The company has installed in its B-47 assembly area a giant self-service "supermarket" for issuing some 25,000 different kinds of aircraft parts to production workers.

The idea will save a quarter-million dollars the first year, W. A. Benson, production control chief, said. Savings include a 25% reduction in floor service and stock control personnel and 60,000 sq ft less floor space.

C. J. Stanger, department manager, had the idea for the unusual innovation in 1945 and has been perfecting it ever since. Aircraft parts travel from final fabrication points through a central distributing area and into some 1,000 bins and racks. These are located within a few feet—often within arm's length—of where workers actually install the parts in airplanes. This saves thousands of steps and hours of time.

When a worker needs a part, he reaches for it. And it's there!

Experiments on the system were started a year ago on a pilot basis. Its immediate success, plus the ease with which the plan can be set up, has led to a decision to extend the idea to sub-assembly departments and the C-130A turboprop production program. This will bring more savings in operational costs.

"When we first put the plan into effect," Stanger said, "we ran into added advantages we didn't expect.

"A lot of paper work is eliminated because parts flow automatically from fabrication to user.

"And, to top it off, inspection time in rejecting parts is shortened . . ."

He gives major credit for success of the program to the production workers who have accepted responsibility for keeping up with the valuable parts. This is a keystone in the system's successful operation.

Girdler Moves Tulsa Office

J. L. PARKER, Southwestern Representative of THE GIRDLER COMPANY'S GAS PROCESSES DIVISION, has moved his office to 301 Wright Building, TULSA, OKLAHOMA.

Girdler is a division of the National Cylinder Gas Company, Chicago.

Nelson Stud Welding—Ala.

Announcement of the appointment of SHOOK & FLETCHER INSULATION COMPANY, 2431 1st Avenue South, BIRMINGHAM, ALABAMA, as an authorized dealer to handle Remington stud drivers and studs, has been made by NELSON STUD WELDING DIVISION OF GREGORY INDUSTRIES, INC., Lorain, Ohio.

The Lorain firm was recently named national distributor for the powder-actuated tool manufactured by the Remington Arms Company, a division of duPont.

One man can set as many as five studs a minute into concrete, masonry or steel with the Remington stud driver. It is widely used to reduce fastening costs on all types of construction and plant maintenance.

Oliver Joins Wheland—Tenn.

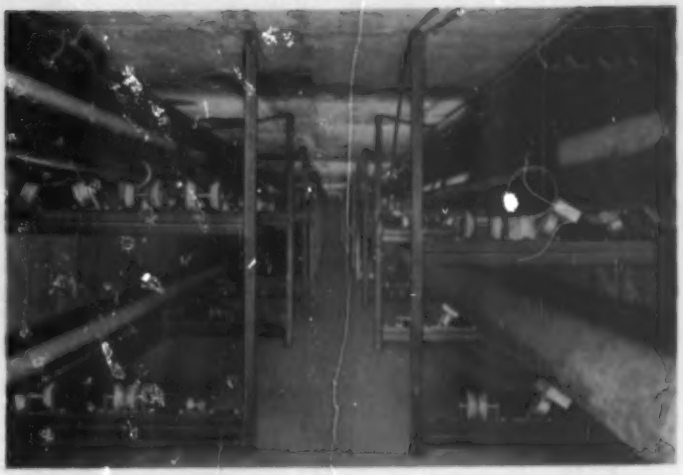
JOHN OLIVER has joined the staff of the WHELAND COMPANY, CHATTANOOGA, TENNESSEE, as special assistant to Gordon P. Street, President. He was formerly general manager of the Tennessee Valley Authority.

Oliver's primary interest will be in the continually expanding oil field activities of the company and in the development of new markets and products. Wheland's three plants are presently engaged in the production of grey iron castings for the automotive industry, the design and fabrication of complete sawmill and rotary drilling equipment, and the production of 75 and 90 mm cannons for national defense.

Harry Heller of Reed Roller Bit Co. Dies in Houston

HARRY O. HELLER, for the past twenty years advertising manager of the REED ROLLER BIT COMPANY, died December 1 in Houston, Texas.

Mr. Heller was the second president of the Houston chapter of the National Industrial Advertisers Association, and always took a leading part in the activities of this and other advertising and marketing organizations.



Framing Simplifies Piping Installation

The partially completed installation in a 300-ft tunnel between the Power House and Teaching Hospital at the UNIVERSITY OF MISSISSIPPI at JACKSON, MISSISSIPPI, was erected with "Mult-A-Frame" and resulted in time and money savings. Using concrete inserts, pipe clamps and roller pipe supports on channel bracing, this installation supports great weight, allows for pipe expansion.

"Mult-A-Frame" (Ainsworth Manufacturing Corporation) is easily installed, requiring only a saw and a wrench. Structures made with this framing material can be dismantled and re-used to meet entirely new requirements for virtually every industry.

DURAMETALLIC *Packings*

Write today for FILE No. DMSP describing the complete line of Durametallic wear-free packings.

Product of
DURAMETALLIC CORP., KALAMAZOO, MICH.
Also manufacturers of rotary mechanical seals, oil pressure systems and packing tools.

$$$

For Your Ideas

SP&I's "Helping the Man-in-the-Plant" department (starts on page 72) features ideas, methods and gadgets — many plant-tested in Southern and Southwestern industrail, power and service plants.

Send your ideas, methods and short-cuts to Southern Power & Industry. Payment is made for suitable material—a photo or rough sketch will make your idea more valuable.

Articles from maintenance and production men in Southern and Southwestern plants are preferred. Material must not have appeared elsewhere nor been sent to another publication.

Southern Power & Industry
806 Peachtree St., N.E.
Atlanta 5, Georgia

News for the South and Southwest (continued)

David E. Allen Appointed Anaconda Vice President

ANACONDA WIRE & CABLE CO., 25 Broadway, New York, N. Y., has announced the appointment of DAVID E. ALLEN as vice president in charge of sales, succeeding L. R. LOVE, who will continue as vice president of the company, in an advisory capacity.

David E. Allen

Mr. Allen, a graduate of the U. S. Naval Academy at Annapolis, held several positions in the utility industry before joining Anaconda W & C in 1932. He is well known in the Southeast, having made his headquarters in ATLANTA for many years as district manager. He has served in various capacities in sales and engineering, both in headquarters at Hastings-on-Hudson and on field service. He became assistant chief engineer in 1948, then sales manager, and finally general sales manager, a position he has held since 1952.

A. H. Baxter Represents Richardson-Allen Corp.

RICHARDSON - ALLEN CORPORATION, College Point, L. I., N. Y., manufacturers of selenium rectifiers, chargers and electronic specialties, have appointed ANDREW H. BAXTER, 412 Albee Bldg., WASHINGTON, D. C., to represent them in sales throughout the District of Columbia and in Maryland and Virginia.

Mr. Baxter, after being graduated from the University of Pennsylvania, concluded a course in electrical engineering at George Washington University. He began active selling in the lighting fixture industry. He followed this up with specialization in sales representation, later becoming established in his own business as manufacturers' representative.

Texas Instruments Buys Houston Plant Location

J. E. Jonsson, president of TEXAS INSTRUMENTS INCORPORATED, Dallas, has announced that Texas Instruments has purchased 6 acres of land in Houston, Texas. The tract is located on Buffalo Speedway at the intersection with the proposed extension of Richmond Avenue.

Mr. Jonsson stated that plans are now being considered for construction on the land of a new plant and general headquarters for HOUSTON TECHNICAL LABORATORIES, a wholly owned subsidiary of Texas Instruments. Houston Technical Laboratories manufactures gravity meters, geophysical instruments and optical components. ROBERT W. OLSON is president of Houston Technical Laboratories.

New Container Plant for Robert Gair Co.—Atlanta

ROBERT GAIR COMPANY, INC., 155 E. 44th St., New York, has announced plans to establish a new corrugated box plant at ATLANTA, GEORGIA.

The company has leased, with option to purchase, a modern manufacturing plant now being erected at 1235 Chattahoochee Avenue, about five miles from the center of the city. Equipment will include a combiner and necessary auxiliary equipment for the manufacture of all types of corrugated shipping containers. The plant will receive its supply of paperboard from the company's new kraft mill at Port Wentworth, Georgia. Operation about February 1, 1955, is scheduled.

Bellows Co.—Ala., Va.

THE BELLOWS COMPANY, 222 W. Market St., Akron 9, Ohio, has established new sales offices in BIRMINGHAM, ALABAMA, and RICHMOND, VIRGINIA.

ELWOOD E. ZERBE is field engineer at the Birmingham office, which is located at 1727 Sixth Ave. North. HENRY W. POBURKA serves as field engineer at the office in Richmond, at 1 North 6th St.

The new sales offices for Bellows "Controlled-Air-Power" devices are under the direction of SIDNEY B. EHRLICH, ATLANTA, district manager for the Southeast.

Nalco—Southeast

NATIONAL ALUMINATE CORPORATION, 6216 West 66th Place, Chicago 38, Ill., announces the appointment of JOHN D. MELLON as a technical representative, with headquarters in COLUMBIA, SOUTH CAROLINA.

John D. Mellon

The Southeastern district, which includes Florida, Georgia, South Carolina and defined sections of Virginia, North Carolina and Alabama, is under the general supervision of W. O. WIDENER, ST. SIMONS ISLAND, GEORGIA.

The other Southeastern representatives of Nalco are: E. B. WELCH, JACKSONVILLE, FLORIDA; R. E. TOWELL, AVONDALE ESTATES, GEORGIA; and W. T. SULLIVAN, GREENSBORO, NORTH CAROLINA.

New Southwestern Offices for Rockwell Manufacturing

ROCKWELL MANUFACTURING COMPANY'S METER AND VALVE DIVISION has established a new district office at 328 Rickou-Brewster Bldg., SHREVEPORT, LOUISIANA. DEAN COLLINS, the new district manager, has been with the company since 1935. He was formerly sales engineer at the Tulsa office.

A new West Texas branch office has been established at MIDLAND, TEXAS, and Rockwell's DALLAS, TEXAS, sales office has been converted into a district as well as regional headquarters. EDWARD D. PROPPS is district manager at Dallas.

HERBERT M. LOGAN succeeds ROY R. BUSH as district manager of the TULSA, OKLAHOMA, office. Mr. Logan joined Rockwell in 1934 as sales engineer.

A new Midwestern sales region includes both the Tulsa and the Kansas City districts. The KANSAS CITY district is headed by M. D. GILBERT.

Tulsa Representative For Cleaver-Brooks

The Cleaver-Brooks Company announces the appointment of the REX BIRCKET & COMPANY, TULSA, OKLAHOMA, as manufacturer's representative for the sale of Cleaver-Brooks boiler equipment.

Located at 424 South Cheyenne Avenue in Tulsa, its territory will include the entire state of Oklahoma and several counties in northwestern Arkansas.

Cleaver-Brooks Company manufactures oil, gas and combination gas/oil fired stationary boilers, mobile steam boilers, evaporators, distillation equipment and industrial gas and oil burners.

Hercules Motors Opens Jacksonville Branch

To better serve the Southeast, HERCULES MOTORS CORPORATION has opened a new factory branch located at 400 South Edgewood Avenue, JACKSONVILLE, FLORIDA. The new branch will serve as a parts warehouse for FLORIDA, ALABAMA, GEORGIA and SOUTH CAROLINA. Facilities of the new factory branch include a large salesroom, modern offices, complete parts department and fully equipped repair shop.

Hercules gasoline, gas and diesel engines and power units will be available for immediate delivery. In addition, a large stock of service parts will be maintained at all times to provide an immediate source of parts for the many users of Hercules engines in the construction, transportation, industrial and marine industries.

The new branch is manned by factory trained personnel. JOHN C. POULTON is branch manager.

T. B. Wood's Expands Dallas Operations

T. B. WOOD'S SONS COMPANY, 1117 W. Commerce Street, Dallas, Texas, has added more warehousing space and a modern, functional, air conditioned office building to adequately supply and service their many customers in the Southwest.

ROBERT G. CAHILL, Wood's Southwest District Manager, heads up a staff of six men. A complete line of mechanical power transmission equipment is carried in stock.

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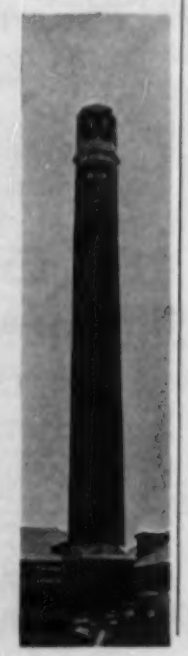

Electric Transmission & Distribution

EDITED BY BERNHARDT G. A. SKROTZKI
PUBLISHED BY MCGRAW-HILL BOOK COMPANY
330 W. 42nd St., New York 36, N. Y.
448 pages
Price, $7.50

This volume starts with an outline of a-c and d-c theory basic to design of practical equipment. Subsequent chapters describe equipment used in transmission and distribution of electric energy from generating station to consumer.

Subjects discussed include overhead and underground circuits; high and low voltage circuits; capacitors and transformers; auxiliaries; protection against short circuits and lightning; and street lighting.

Descriptions are developed in such a way as to give a general idea of actual layout of equipment and what it does in the utility system.

Alternating-Current Machines

BY A. F. PUCHSTEIN, T. C. LLOYD, and A. G. CONRAD
PUBLISHED BY JOHN WILEY & SONS, INC.
440 Fourth Ave., New York 16, N. Y.
721 pages
Price, $8.50

This third edition begins with transformers, and shows how to understand, test, predict, and calculate the behavior and performance of the most important classes of alternating current power machinery. The theories of the operation of these machines stand as excellent mediums for the development of engineering disciplines. The authors have selected the order and methods of presenting their material on the basis of effective training in these disciplines.

Conveyors and Related Equipment

BY WILBUR G. HUDSON
PUBLISHED BY JOHN WILEY & SONS, INC.
440 Fourth Ave., New York 16, N. Y.

524 pages
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This third edition is a completely up-to-date account of the applications and limitations of the various types of modern materials handling equipment, expanded by about 25% over the previous edition.

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Electric System Operation

EDITED BY G. A. SKROTZKI
PUBLISHED BY MCGRAW-HILL BOOK COMPANY
330 W. 42nd St., New York 36, N. Y.

370 pages
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This volume describes in detail the operation of generating, transmitting, and distributing equipment, covering the major problems in running an electric system to realize the full benefits of safety, reliability, and economy.

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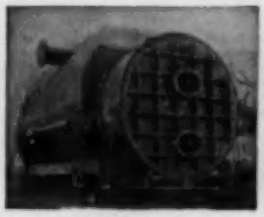

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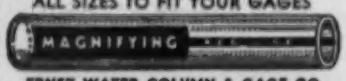

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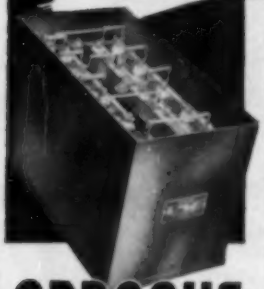

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A

Adams Cook's Sons, Inc. ..... *
Air Preheater Corp. 63
Allen-Bradley Co. 6
Allen-Sherman Hoff Co. 27
Allis-Chalmers Mfg. Co. ...Second Cover
American Blower Corp. .....30 & 31
American Chimney Corp. 90
American Engineering Co., Stoker Div. *
American Monorail Co. 84
Ames Iron Works ..... *
Anaconda Wire Cable Co. ..... *
Annin Co. 89
Arco Co. ..... *
Armstrong Machine Works 67
Atlantic Steel Company 75
Atlas Valve Co. 98

B

Babbitt Steam Specialty Co. 95
Babcock & Wilcox (Boilers) .....14 & 15
Babcock & Wilcox Refractory Div.... *
Bailey Meter Co. 79
Beico Industrial Equipment Div. .... *
Bell & Zoller Coal Co. ..... *
Belmont Packing & Rubber Co. ..... *
Bird-Archer Co. ..... *
Bituminous Coal Institute 35
Blackmer Pump Co. ..... *
Blaw-Knox Co., Power Piping Div... *
Boiler Engineering & Supply Co. ..... *
Boiler Tube Co. of America ..... *
Borden Metal Products Co. 87
Buell Engineering Co., Inc. 87
Buffalo Forge Co. 26
Bunting Brass & Bronze Co. 77
Bussman Mfg. Co. ..... *
Byers Co., A. M. ..... *

C

Cambridge Wire Cloth Co. ..... *
Carolina Refractories Co. 91
Catawissa Valve & Fitting Co. ..... *
Chapman Valve Mfg. Co. 86
Chesapeake & Ohio Railway Co. ..... *
Chicago Bridge & Iron Co. 51
Childers Mfg. Co. ..... *
Cities Service Co. ..... *
Clarage Fan Co. ..... *
Classified Ads 94
Cochrane Corporation 25
Cole Mfg. Co., R. D. ..... *
Combustion Engrg., Inc. ..... *
Combustion Equipment Division, Todd Shipyards Corp. ..... *
Condenser Service & Engineering Co., Inc. 91
Continental Gin Co. 2
Cooper-Bessemer Corp. ..... *
Copes-Vulcan Division — Continental Foundry & Machine Co. 32
Coppus Engineering Corp. ..... *
Crane Company 69
Custodis Construction Co. ..... *
Cyclotherm Corp. 96

D

Dart Union Co. 73
DeLaval Steam Turbine Co. ..... *
Detroit Stoker Co. 19
Diamond Chain Co., Inc. ..... *
Dowell, Inc. .....Fourth Cover
Dura metallic Corp. 87
Durkee-Atwood Co. 97

E

Edward Valves, Inc. ..... *
Electric Service Co. 94
Electric Wheel Company ..... *
Emerson Electric Mfg. Co. ..... *
Engineer Co. ..... *
Erie City Iron Works 21
Ernst Water Column & Gage Co..... 94
Everlasting Valve Co. ..... *

F

Fairbanks Co. ..... *
Fairbanks, Morse & Co. ..... *
Finnigan, J. J., Co., Inc. 97
Fisher Governor Co. 7
Fiske Bros. Refining Co., Lubriplate Div. ..... *
Flexible Steel Lacing Co. ..... *
Fluor Corp., Ltd. ..... *
Foster Engineering Co. ..... *
Foster Wheeler Corp. ..... *
Frick Company 8
Furnas Electric Co. ..... *

G

Garlock Packing Co. ..... *
General Coal Co. ..... *
General Electric Co. ..... *
Gilbert Associates 86
Goulds Pumps, Inc. ..... *
Graver Water Conditioning Co. ..... *
Grinnell Co., Inc. ..... *
Gulf Oil Corp. 22, 23

H

Hotel Pittsburgher ..... *

I

Industrial Crane & Hoist Corp. ..... *
Ingersoll-Rand Co. ..... *
International Chimney Corp. ..... *
Iron Fireman Mfg. Co. 65
Ironton Fire Brick Co. ..... *

J

Jacksonville Blow Pipe Co. 83
Jenkins Bros. .....Third Cover
Jerguson Gage & Valve Co. ..... *
Johns-Manville, Inc. ..... *

K

Kano Laboratories ..... *
Kellogg Company, M. W. 81
Kerrigan Iron Works, Inc. ..... *
Kirk & Blum Mfg. Co. ..... *

L

Leslie Co. ..... *
Liberty Engineering & Mfg. Co. ..... *
Louden Machinery Co. ..... *
Lowell Wrench Company ..... *
Lubriplate Division, Fiske Bros. Refining Co. ..... *
Lucey Boiler & Mfg. Corp. 83

M

McAlear Manufacturing Co. ..... *
Magnetrol, Inc. 93
Manning, Maxwell & Moore, Inc. ... 24
Manzel, Inc. ..... *
Marley Co., Inc. ..... *
Mason-Neilan Regulator Co. ..... *

N

National Airoil Burner Co. ..... *
National Aluminate Corp. 1
National Coal Association 35
National Conveyor Co., Inc. 66
National Supply Co., Spang-Chalfant Div. 61
National Tube Co. 20
National Valve & Mfg. Co. 59
Niagara Blower Co. ..... *
Nicholson & Co., W. H. 11
North Brothers 89

O

Oakite Products, Inc. ..... *
Ohio Injector Co. ..... *
O'Neal Steel Works ..... *
Orr Sembower, Inc. ..... *
Otis Elevator Co. ..... *

P

Pacific Pumps, Inc. 62
Parkdale Co. 91
Peerless Pump Division Food Machinery & Chemical Corp. ..... *
Penberthy Injector Co. 85
Permutit Co. ..... *
Petro ..... *
Philadelphia Gear Works ..... *
Pittsburgh Piping & Equipment Co... *
Plibrico Company ..... *
Powell Valves 13
Powers Regulator Co. 92
Print-Daniel Corp. ..... *

R

Raybestos-Manhattan, Inc., Packing Division ..... *
Reliance Gauge Column Co. ..... *
Republic Flow Meters Co. ..... *
Riley Stoker Corp. ..... *

S

Sarco Co., Inc. 32
Sinclair Refining Co. ..... *
Southern Natural Gas Co. ..... *
Southern Power & Industry 91
Southern Railway System ..... *
Sprague Electric Co. 95
Springfield Boiler Co. ..... *
Standard Oil Co. of Ky. ..... *
Sterling Electric Motors, Inc. ..... *
Stromberg-Carlson Co., Telephone Division ..... *
Subox, Inc. ..... *
Superior Combustion Industries, Inc. *

T

Taylor Forge & Pipe Works ..... *
Terry Steam Turbine Co., The ..... *
Texas Co. ..... *
Thermix Corp. ..... *
Todd Shipyards Combustion Equipment Div. ..... *

U

U. S. Treasury ..... *
United States Rubber Co. ..... *
United States Steel Co. 20

V

Virginia Gear & Machine Co. ..... *

W

Walker-Turner Div. Kearney & Trecker Corp. ..... *
Walworth Co. 9
Want Ads 94
Warren Steam Pump Co., Inc. ..... *
Webster Engineering Co. 88
Western Engineering & Mfg. Co. ..... *
Western Precipitation Corp. 28
Westinghouse Electric Corp. ..... *
Wiegand Co., Edwin L. 84
Wiggins Co., John B. 92
Wilson, Inc., Thomas C. 97
Wing Mfg. Co., L. J. ..... *

Y

Yarnall-Waring Co. 55

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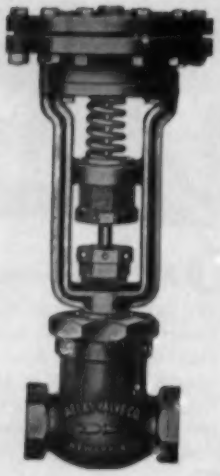

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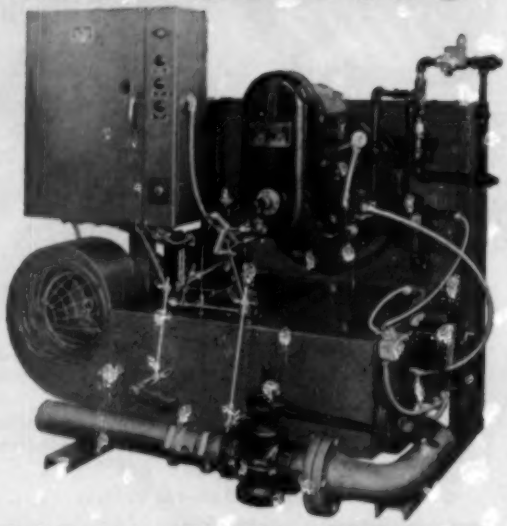

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JENKINS PRACTICAL PIPING LAYOUTS 74

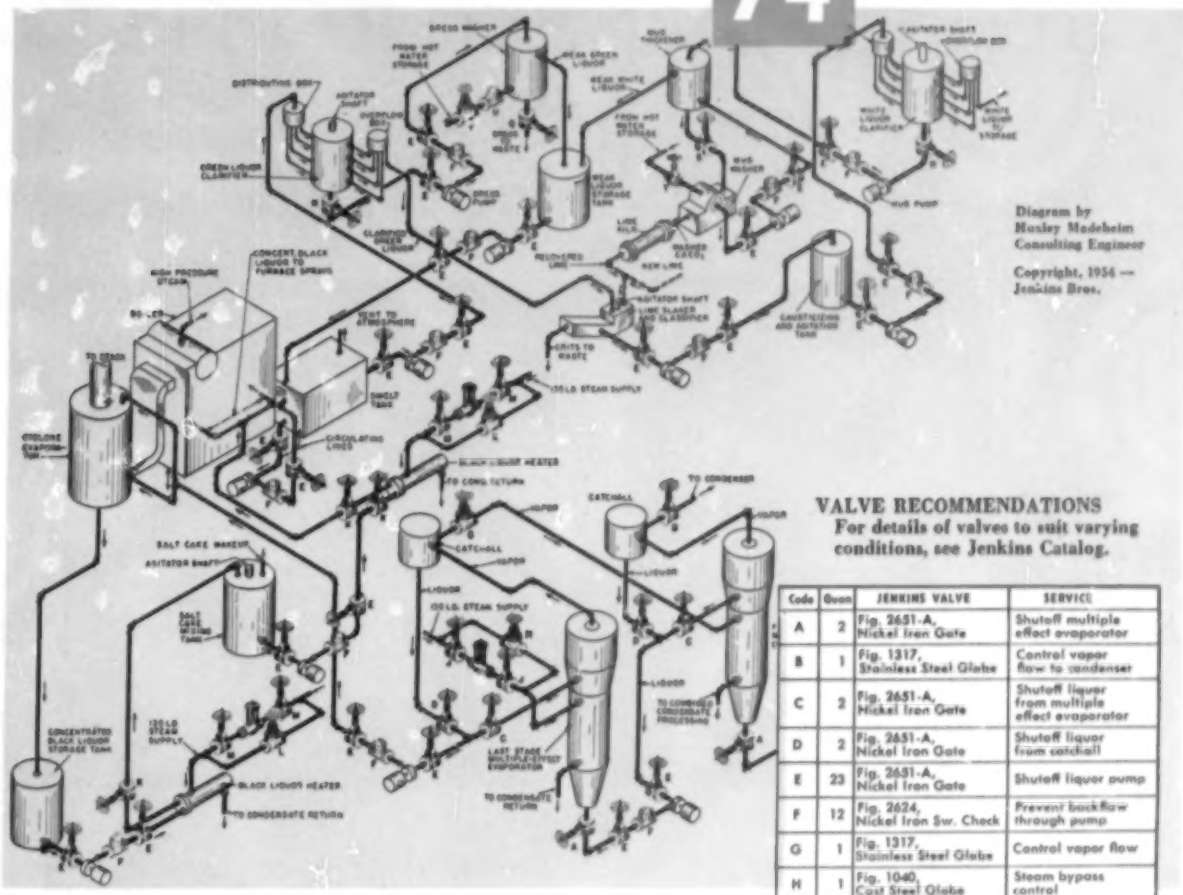

Diagram by Hunley Madeheim Consulting Engineer

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How to plan a SULFATE PULPING LIQUOR RECOVERY SYSTEM

An important economy of the sulfate pulping process is the recovery of the residual fluid (black liquor). The diagram shows piping for the recovery cycle in which black liquor is converted to white liquor for reuse in the digester.

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Code	Quan	JENKINS VALVE	SERVICE
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B	1	Fig. 1317, Stainless Steel Globe	Control vapor flow to condenser
C	2	Fig. 2651-A, Nickel Iron Gate	Shutoff liquor from multiple effect evaporator
D	2	Fig. 2651-A, Nickel Iron Gate	Shutoff liquor from catchall
E	23	Fig. 2651-A, Nickel Iron Gate	Shutoff liquor pump
F	12	Fig. 2624, Nickel Iron Sw. Check	Prevent backflow through pump
G	1	Fig. 1317, Stainless Steel Globe	Control vapor flow
H	1	Fig. 1040, Cast Steel Globe	Steam bypass control
J	2	Fig. 1009, Cast Steel Gate	Control valve shutoff
K	3	Fig. 2651-A, Nickel Iron Gate	Liquor heater shutoff
L	2	Fig. 1040, Cast Steel Globe	Steam bypass control
M	4	Fig. 1009, Cast Steel Gate	Control valve shutoff
N	1	Fig. 2651-A, Nickel Iron Gate	Shutoff dregs from green liquor classifier
P	1	Fig. 613, I.S.B.M. Globe	Control water to dreg washer
Q	1	Fig. 2651-A, Nickel Iron Gate	Shutoff dregs to waste
R	1	Fig. 2651-A, Nickel Iron Gate	Shutoff mud from white liquor classifier
S	1	Fig. 2651-A, Nickel Iron Gate	Shutoff mud to mud filter
T	1	Fig. 106-A, Bronze Globe	Control water to mud filter
U	1	Fig. 2624, Nickel Iron Swing Check	Prevent backflow to water line

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